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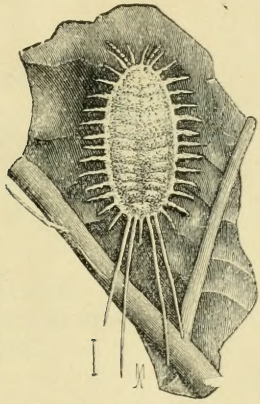
The Canadian Entomologist

VOLUME XXXIV.



Dactylopius longifilis, Comst.

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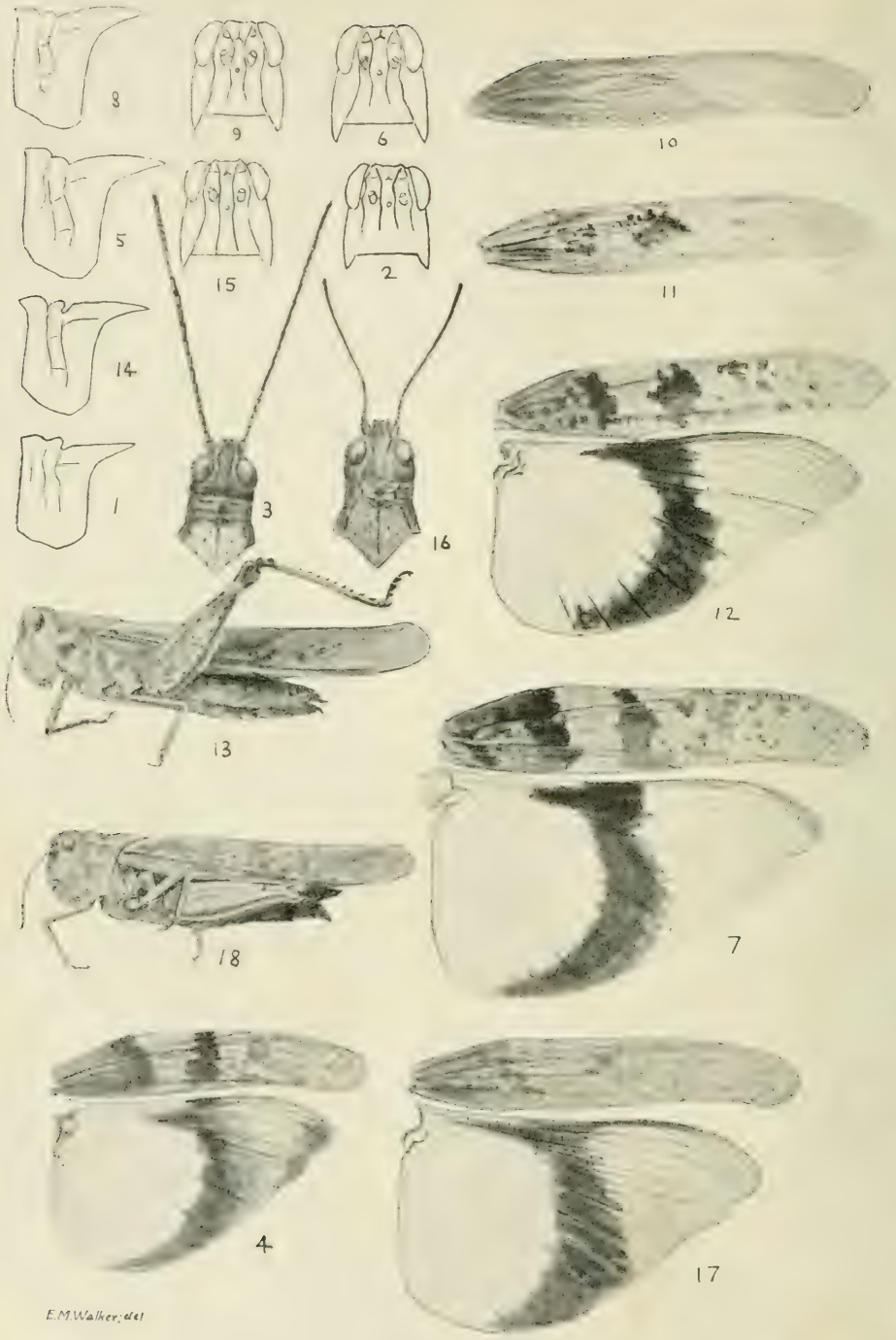

CANADIAN SPECIES OF TRIMEROTROPIS

The Canadian Entomologist.

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THE CANADIAN SPECIES OF TRIMEROTROPIS.

BY E. M. WALKER, B. A., TORONTO.

As only three specimens of *Trimerotropis*, Stal, have been reported from Canada, and as the writer has taken several others, of which three seem to be undescribed, the present paper may be of some value as a preliminary notice of the Canadian species of this genus.

The following table will serve to distinguish the species of Trimerotropis known to occur in Canada. It is artificial, but as the species enumerated are few, the table will perhaps be of greater service than would a more natural one. In the notes following the table the species are arranged according to McNeill's recent "Revision of the Orthopteran Genus Trimerotropis," the new species being placed according to their nearest affinities.

Key to the Canadian Species of Trimerotropis.

A[1] Hind tibiæ red, tegmina crossed by bands which may be conspicuous or faint on account of the slight contrast between them and the ground colour.

a[1] Disk of the metazone of the pronotum plainly lighter than the prozone. Bands of tegmina distinct, but formed by the segregation of numerous small spots.....3. *monticola*, Sauss.

a[2] Disk of the metazone not distinctly lighter than the prozone.

b[1] Bands of the tegmina conspicuous, solid, and not formed by a segregation of small spots; process of the metazone acute.....4. *Bruneri*, McNeill.

b[2] Bands of the tegmina inconspicuous, and made up of fuscous annuli; process of metazone obtuse.....5. *citrina*, Scudd.

A[2] Hind tibiæ never red.

a[1] Hind tibiæ blue. Bands of tegmina conspicuous, but made up of fuscous spots. Fuscous band of the wing very narrow.....2. ? *cæruleipes*, Scudd.

a² Hind tibiæ green or yellow. Bands of tegmina variable.
b¹ Lower sulcus of hind femora light, with two dark bands.
c¹ Tegmina long and narrow, the bands obsolete or represented by irregular groups of segregated spots. Hind tibiæ yellowish. Antennæ of male shorter than hind femora..1. *maritima*, Harris.
c² Tegmina of ordinary length and width, the bands conspicuous, the basal and median being solid. Hind tibiæ green. Antennæ of male longer than hind femora .....6. *longicornis*, n. sp.
b² Lower sulcus of hind femora black, with one preapical light band.
c¹ Spur of the fuscous band of the wing extending about half-way to the base. Tegmina either with distinct bands, or when this is not the case, not sprinkled throughout with fuscous annuli.
d¹ General colour light or dark brown, much varied with fuscous. Area of the cubital forks in ♀ occupied by several rows of cubical cells. Tegmina always crossed by well-defined bands.7. *vinculata*, Scudd.
d² General colour ash-gray, varied with brown and white. Area of the cubital forks in both sexes occupied, at least in the basal part, by a single row of cubical cells. Tegmina variable ; bands usually poorly developed, often entirely absent, but sometimes well defined .....8. *huroniana*, n. sp.
c² Spur of the fuscous band of the wing extending very nearly to the base. Tegmina sprinkled with fuscous annuli, which show very little, if any, tendency to form bands..8. *sordida*, n. sp.

1. Trimerotropis maritima, Harris.
Locusta maritima, Harris, Ins. Inj. to Veg., 1841, p. 178.
Oedipoda maritima, Scudd., Mat. Mon. N. A. Orth., 1862, p. 472.
Trimerotropis maritima, Stal, Recens. Orth., I., 1873, p. 135.

This species is found plentifully in Southern Ontario, along the shores of the great lakes, occurring in a form somewhat different from the typical one of the Atlantic Coast, and to which I have given the racial name, *interior* (Can. Ent., XXX., 262).

McNeill's description of *maritima* in his recent Revision (p. 450) seems to have been based entirely upon specimens from the Atlantic Coast, and it does not fit *interior* in all respects. The width of the wing-band in the latter is often nearly one-fourth the length of the wing, whereas McNeill states that it is never as much as one-sixth; and the tegmina of *interior* often show distinct traces of three bands, which fact is also contrary to McNeill's description. Moreover, the measurements given are much too large for the race *interior*, although the latter is very variable in size. Accordingly, I give the following measurements taken from Ontario specimens:

Length of body, ♂ 19 to 22 mm., ♀ 26 to 30 mm.

Length of tegmen, ♂ 19 to 24 mm., ♀ 27 to 31 mm.

Length of hind femora, ♂ 11 to 12 mm., ♀ 13.5 to 15.5 mm.

I have specimens from the following localities: Toronto Id., July–Sept.; Rond Eau, Sept. 14, 1899; Point Pelee, Aug. 7, 1901; Kingsville, Aug. 13, 1897; Walpole Id., St. Clair River, Aug. 13, 1901; Southern extremity of Lake Huron, near Sarnia, Aug. 12 and 14, 1901.

2. Trimerotropis ?cæruleipes, Scudd.

Trimerotropis cæruleipes, Scudd., 2nd Rept. U. S. Ent. Com., App. 11, 1880, p. 27.

Mr. Scudder, to whom I sent a specimen of this insect for determination, replied that it was "apparently a new species near *cæruleipes*, or else that species, which is very variable," and remarked that he had a specimen like mine from Yellowstone Park. My specimens are from Discovery Id., near Victoria, B. C., Sept. 6, 1897; Nanaimo and Duncan's, Vancouver Id., Sept. 7, 1897. It is a very common insect on Vancouver Island, in both rocky and sandy districts. I found it in great numbers on Discovery Id., one of the numerous small islands near Victoria. Here it flew with a swift, low flight about the bare rocks in the more open places, the males producing a very rapid crepitation.

3. Trimerotropis monticola, Sauss.

Trimerotropis monticola, Sauss., Prodr. Œdip., 1884, p. 170.

This is the most abundant species of the genus on the dry plains of Assiniboia. It bears an extraordinarily close resemblance to one of the

commonest forms of *Spharagemon collare*, Scudd., which is met with in the same situations. It can be distinguished at once, however, by the two-notched median carina, the *Spharagemon* having but one.

I have specimens from Moose Jaw, Ass'a, Aug. 30, 1897 ; near Waldeck, Ass'a, Aug. 30, 1897 ; near Gull Lake, Ass'a, Aug. 30, 1897 ; Swift Current, Ass'a, Sept. 20, 1897 ; Morse, Ass'a, Sept. 20, 1897 ; Vernon, B. C., Sept. 10, 1897.

4. Trimerotropis Bruneri, McNeill.

Hadrotettix gracilis, Bruner, MSS.

Trimerotropis Bruneri, McNeill, Proc. U. S. Nat. Mus., XXIII., 1901, p. 423.

I have a single male of this species, taken at Swift Current, Ass'a, Sept. 20, 1897.

5. Trimerotropis citrina, Scudd.

Trimerotropis citrina, Scudd., Bull. U. S. Geol. Surv. Terr., II., 1876, p. 265.

I have seen no Canadian specimens of this form, but it has been reported by Scudder from Manitoba.

6. Trimerotropis longicornis, new species. (Pl. I., figs. 1–4.)

♂. Of medium size, dull grayish-brown, paler beneath. Head of average size, ash-gray below the ocellus, infuscated above. Face evenly but rather sparsely and indistinctly punctate throughout. Occiput considerably elevated above the pronotum, evenly convex, dark grayish-brown. Scutellum a little longer than broad, strongly sulcate, limited in front by a V-shaped depression. Median carina present, but faint. Lateral carina well marked, forming a very obtuse and somewhat rounded angle opposite the anterior margin of the eyes, from which they converge to meet the frontal costa. Lateral foveolæ triangular, rather large and shallow. Frontal costa failing by some distance to reach the clypeus, sulcate at and for a short distance below the ocellus, where it is slightly expanded ; above the ocellus plane and evenly punctate. Lateral carinæ of the face reaching the clypeus, but not prominent. Eyes moderately prominent, about as long as the genal groove. Antennæ surpassing the hind femora by about one-fourth the length of the latter. Pronotum dark grayish-brown, rather short. Greatest width of disk about seven-eighths of the length. Prozone somewhat elevated and tectiform, three-fifths as long as the metazone. Disk of metazone much lighter than the

prozone, being pale grayish-brown, finely granulose with a few small scattered black tubercles ; process very slightly obtusangulate, the sides straight and the tip scarcely rounded. Median carina slightly cristate on the front part of the metazone, but gradually fading behind into a mere raised line, cristate and prominent on the prozone, and distinctly bilobate, the anterior lobe about twice as long as the posterior, the posterior notch much more prominent than the anterior. Lateral carinæ distinct only on the front part of the metazone. Tegmina of ordinary length and width. Area of cubital forks occupied by two or three rows of irregular cells. Markings of tegmina very like those of *T. vinculata* ; inner third occupied by a solid dark brown band, with a well-defined unbroken margin, beyond which are two others of the same colour, a solid median band about half as wide as the basal, and a still narrower, somewhat irregular and broken band between the outer and middle thirds of the tegmen. These bands are separated by light brown bands of about the same width as the median band. Apical third semi-transparent, with a few scattered dark brown spots. Wings with the disk light yellow, apical portion infuscated at tip, the hyaline area rather limited in extent, and not definitely separated from the rather narrow fuscous band which crosses the wing slightly beyond the middle and does not reach the anal angle. Spur extending half way to the base. Hind femora externally grayish-brown, with a pale yellow preapical annulus and crossed by two dark brown, not very well defined, bands ; internally the disk, inner, and upper sulci, are light yellow, crossed by two black bands. Hind tibiæ light green, with a pale yellowish sub-basal annulus.

Length of body, 21 mm. ; length of antennæ, 14.5 mm. ; length of head and pronotum, 7 mm. ; length of tegmen, 22 mm. ; length of hind femora, 11.5 mm.

Described from one male, Vernon, B.C., Sept. 10, 1897. I have another specimen, also a male, taken on the same date at the same locality, which I feel pretty sure belongs to this species, but differs so much in the character of the wing-band and in several less important points that I have hesitated to place them together. In this specimen the width of the fuscous band in its widest part is equal to fully one-fourth the length of the wing, it crosses the middle of the wing in the usual way, its outer margin is well defined, and the apical portion of the wing is hyaline, with only the slightest trace of infuscation at the apex. The antennæ are

somewhat shorter, but are still longer than the hind femora, the pronotum slightly longer, the greatest width of the disk being about four-fifths the length. All these points, with the exception of the character of the wing-band, might easily be due to individual variations, and in all other respects the specimens agree closely, so that the species is probably very variable in the markings of the wings.

T. longicornis seems to approach *T. salina*, Bruner, but I have not seen the latter species.

7. Trimerotropis vinculata, Scudd. (Pl. I., figs. 5–7.)

Trimerotropis vinculata, Scudd., Ent. Notes, V., 1875–76, p. 25.
Trimerotropis cincta, Sauss., Prodr. Œdip., 1884, p. 171.

I have specimens of this species from Agassiz, B. C., Sept. 9, 1897; Vernon, B. C., Sept. 10, 1897; Revelstoke, B. C., Sept. 19, 1897. I found it very common at Vernon in dry, open places, but at each of the other localities I took but a single specimen.

It has also been reported by Dr. Fletcher from Victoria, B. C. (Rep. Exp. Farms Can., 1888, 63).

8. Trimerotropis huroniana, new species. (Pl. I., figs. 8–13.)

Of medium or rather small size; pale ashy gray, varied with brown and white; in its general colour and maculation much resembling *T. maritima*, race *interior*.

Head of the ordinary size, pale ash-gray or nearly white, faintly mottled with darker gray. Occiput considerably (♂), very slightly (♀), elevated above the level of the pronotum, nearly smooth; brownish fuscous, with paler grayish mottlings, especially externally, where they form a pale postocular band continuous along the margin of the disk of the pronotum, with a more or less distinct band of the same colour. Below this pale band there is more or less indication of a grayish fuscous postocular band, more distinctly defined above than below, where it merges into the grayish mottlings of the genæ. Scutellum longer than broad (♂), about as long as broad (♀), strongly sulcate, limited in front by a V-shaped depression; median carina usually distinct, especially anteriorly, sometimes nearly obsolete. Lateral carinæ sharp, lighter in colour than the disk, extending and slightly diverging from a point opposite the middle of the eye to the front margin of the eye, where they form a marked angle, and whence they converge, keeping a fairly straight course, to meet the frontal costa. Lateral foveolæ rather small, triangular, moderately deep. Frontal

costa deeply sulcate throughout, considerably expanded at the ocellus, above and below which it is constricted, the sides below the lower constriction diverging as they approach the clypeus, which they fail to reach. Lateral carinæ of the face moderately prominent, reaching the clypeus, but less marked in the upper than in the lower portion. Eyes moderately prominent, as long as the genal groove (♂), distinctly shorter (♀). Antennæ about four-fifths (♂) or five-seventhes (♀) as long as the hind femora, grayish brown, slightly darker apically. Pronotum expanding moderately on the metazone, posterior margin rectangulate, the angle but little rounded. Greatest width of disk about four-fifths (♂) or five-sixths (♀) of the length. Prozone not more than half as long as the densely-punctate metazone; the latter gently convex antero-posteriorly and very broadly convex transversely. Median carina a raised line on the metazone, feebly cristate on the prozone, the anterior lobe nearly twice as long as the posterior, the notches, especially the anterior, rather shallow. Lateral carinæ distinct only on the anterior part of the metazone. Sides of the pronotum with two whitish spots, the upper extending across the whole of the prozone, the lower between the two posterior sulci. A dark brown spot separates these, and extends to the anterior margin of the prozone. Tegmina rather long, but of average width, quite like those of *T. vinculata* in form, extremely variable in markings, sometimes being as strongly banded as average specimens of *vinculata*, sometimes perfectly immaculate, with an ill-defined clouding of the basal fourth. Ground colour ashy or light brownish gray, in average specimens with distinct indications of bands, a basal one occupying the basal third or fourth, and a median band generally represented by an irregular but fairly solid spot. Apical third semitransparent, often immaculate, but generally with a variable number of scattered spots, which only in very distinctly marked specimens form any semblance of a band. Wings very similar to those of *vinculata*, slightly less than twice as long as broad. Disk very pale yellow. Fuscous band nearly equal, with both inner and outer margins arcuate; width about one-sixth, or a little more, the length of the wing; the spur extending about half way to the base. Apical portion of wing hyaline, immaculate; many of the veins whitish. Outer face of hind femora very light gray, with a pale yellowish preapical band, and with more or less distinct indications of a basal transverse fuscous band, and median and post-median oblique bands, these bands being generally well

marked in the ♂, but often indistinct in the ♀. Disk of the inner face black, with two light bands, a median and a preapical; the upper sulcus with an additional light band near the base; lower sulcus black, with one preapical light band. Hind tibiæ pale yellow.

Length of body, ♂ 20 mm., ♀ 27 mm.
" " antenna, ♂ 10 mm., ♀ 9.5 mm.
" " head and pronotum, ♂ 7 mm., ♀ 8.5 mm.
" " tegmen, ♂ 22 mm., ♀ 27 mm.
" " hind femora, ♂ 11 mm., ♀ 13 mm.

Described from twenty-one ♂♂, fifteen ♀♀, Southampton, Ont. Aug. 20, 21 and 29, 1901.

This species is closely allied to *T. vinculata* and *T. saxatilis*, McNeill, but I am satisfied that it is distinct from both. Mr. Scudder, to whom I sent a pair, gave his opinion that they agreed slightly better with McNeill's description of *saxatilis* than with *vinculata*, but was unable to decide whether it should be referred to the former or not. I tried to obtain specimens of *saxatilis* for comparison, but was unsuccessful. Nevertheless, after comparing my series with McNeill's rather brief description of *saxatilis*, I find that there are points of difference that seem to be constant. These are as follows:

In *saxatilis* the metazone of the pronotum is not more than one and three-quarter times as long as the prozone; in *huroniana* it is in every specimen in my series fully twice as long as the prozone, and sometimes slightly more. In *saxatilis* the tegmina, though variable, are usually very strongly varied with fuscous, and when nearly plain it is by the suffusion of the ground colour with fuscous. In *huroniana* the tegmina are only occasionally strongly varied with fuscous, and when plain it is not through suffusion, but merely from absence of the bands; in other words, it is the darker specimens of *saxatilis* that have plain tegmina, whereas it is the lighter specimens of *huroniana*. The wings in *saxatilis* are relatively shorter than in *vinculata*, being considerably less than twice as long as broad. In *huroniana*, on the other hand, they are identical in form with those of *vinculata*, and the wing-band is as narrow as in that species, whereas it is broader in *saxatilis*.

It may also be mentioned that *saxatilis* in Arkansas is found only on rocky ground, whereas *huroniana* avoids rocks, being like *T. maritima*, partial to the sandy beaches, close to the water's edge.

From *vinculata*, besides differing in colour and markings, *huroniana* has a more deeply sulcate frontal costa, never being plane above the ocellus, and the area of the cubital forks of the wings is narrower, containing even in the ♀ but a single row of cubical cells in at least the basal portion.

This species is particularly interesting, as it seems to replace *T. maritima* on the northern part of the east shore of Lake Huron. In the vicinity of Southampton there is a limited extent of wide, sandy beach, north of which the shore is continuously rocky. On this beach *huroniana* is to be found under very similar but more boreal conditions to those under which *maritima* is found further south.

In flight it is extremely alert, and its stridulation is peculiar, being a very rapid but not loud crepitation, interrupted about thrice in a second, so that at a little distance it seems to be composed of separate notes. Usually three, sometimes four of these, are produced at a time.

9. Trimerotropis sordida, new species. (Pl. I., figs. 14–18.)

Of medium or rather small size, uniform dull pale grayish-brown, showing very little contrast in the markings of the body and tegmina. Head light brownish, more or less faintly mottled and punctate with a darker and more grayish colour. Occiput barely or not at all elevated above the pronotum, somewhat roughened, slightly darker than the face. Scutellum fully as broad as long, strongly sulcate; the median carina usually distinct for some distance backwards on the occiput, and limited in front by a slight V-shaped ridge, in front of which is a more or less marked depression. Lateral carinæ prominent and sharp, diverging to a point opposite the front margin of the eyes, where they form a marked angle, thence converging in a distinctly incurved course to meet the frontal costa. Lateral foveolæ large, subtriangular, moderately depressed. Frontal costa very strongly sulcate throughout, constricted above and below the ocellus; the sides below the lower constriction gently diverging until they meet the clypeus. Lateral carinæ of the face reaching the clypeus, strongly bent, very prominent and equally so throughout. Eyes moderately prominent, but not large, being even in the ♂ distinctly shorter than the genal groove. Antennæ about four-fifths (♂) or three-quarters (♀) as long as the hind femora, grayish-brown, darker apically. Pronotum of ordinary length, moderately expanded on the metazone. Process of metazone rectangulate or slightly acutangulate, sides straight, angle scarcely rounded. Greatest

width of disk four-fifths (♂), eight- or nine-tenths (♀), the length. Prozone considerably contracted, with the disk rather more than ordinarily wrinkled, as long as or slightly shorter than half the length of the somewhat coarsely granulated metazone, the latter slightly convex both anteroposteriorly and transversely. Median carina prominent throughout, strongly cristate and bilobate on the prozone, the posterior notch especially deep and somewhat oblique; cristate on the anterior part of the metazone. Lateral carinæ very sharp and prominent on the metazone, continued forward a short distance on the posterior part of the prozone. They are also present to a variable extent on the anterior part of the prozone. Tegmina rather long, of moderate width, pale dull brownish, sprinkled throughout with grayish fuscous annuli, which form a more or less distinct group occupying the basal third or fourth, and also show a tendency to collect in the middle of the tegmen, but do not form anything that could be called a band. Area of the cubital forks rather narrow, usually occupied by two or three rows of irregular cells, or, as in one ♂ which I have, by a single row of cubical cells. Wings fully three-fifths as wide as long; disk pale yellow; fuscous band crossing about the middle of the wing not reaching the anal angle, the outer margin less curved than the inner, so that the band is considerably wider where it meets the outer margin of the wing than it is at the costal margin. Greatest width of band varying from one-fourth to slightly more than one-third the length of the wing. Spur extending very nearly to the base. Apical portion of the wing hyaline, with a few fuscous spots near the apex in the ♂, none of the veins whitish. Outer face of the hind femora plain grayish-brown, or with faint indications of darker bands; inner face black, with two light bands, a median and a preapical, the upper sulcus with an additional light band near the base; lower sulcus black, with one preapical light band. Hind tibiæ pale yellowish, slightly darkened apically.

Length of body, ♂ 20 mm., ♀ 23 to 28 mm.
" " antennæ, ♂ 8.5 to 9 mm., ♀ 9 mm.
" " head and pronotum, ♂ 7 to 7.2 mm., ♀ 7.8 to 8.3 mm.
" " tegmen, ♂ 21.5 to 22 mm., ♀ 24 to 26.5 mm.
" " hind femora, ♂ 10.2 to 11 mm., ♀ 11.5 to 12.2 mm.

Described from 3 ♂ ♂ and 2 ♀ ♀. Moose Jaw, Ass'a, Aug. 30, 1897, 1 ♂, 1 ♀; Waldeck, Ass'a, Aug. 30, 1897, 1 ♂; Morse, Ass'a, Sept. 20, 1897, 1 ♂, 1 ♀.

This species is found on the semi-arid plains of Assiniboia. Its flight is higher and slower than that of any other *Trimerotropis* I am acquainted with, resembling that of *Circotettix*, as does also the stridulation to some extent, which, however, is no louder than that of most species of its genus.

In conclusion, I wish to express my sincere thanks to Mr. Scudder for his valuable assistance in determining the material upon which this paper is based.

EXPLANATION OF PLATE I.

Fig. 1, Trimerotropis longicornis, ♂, pronotum.
" 2, " " ♂, face, front view.
" 3, " " ♂, head and pronotum, from above.
" 4, " " ♂, tegmen and wing.
" 5, " vinculata, ♂, pronotum.
" 6, " " ♂, face.
" 7, " " ♀, tegmen and wing.
" 8, " huroniana, ♂, pronotum.
" 9, " " ♂, face.
" 10, " " ♀, tegmen.
" 11, " " ♀, tegmen.
" 12, " " ♀, tegmen and wing.
" 13, " " ♀, lateral view.
" 14, " sordida, ♂, pronotum.
" 15, " " ♂, face.
" 16, " " ♂, head and pronotum.
" 17, " " ♂, tegmen and wing.
" 18, " " ♀, lateral view.

EULECANIUM LYMANI.

SIR,—Permit me to correct a slight error into which Mr. King has fallen in regard to the locality where I found the scales of Eulecanium Lymani, as the tree was not, as stated, at Quebec, but at St. Hilare, a station on the line of the Grand Trunk Railway, about twenty-two miles east of Montreal. I shall be happy to send specimens of this scale to anyone interested in scale insects. H. H. LYMAN.

WEST COAST AND OTHER JASSIDÆ (HOMOPTERA).

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Most of the material upon which the following descriptions are based belongs to the National Museum, and the species are here described at the request of the curator, Dr. W. H. Ashmead.

Eutettix pannosa, n. sp.—Resembling *saucia* and *scaber* in general appearance, smaller, darker, and with longer vertex and more generally reticulate elytra. Length, ♀ 4.5 mm., ♂ 4 mm.; width, ♀ 1.5 mm., ♂ 1.25 mm.

Vertex right angled, apex blunt, three-fifths as long as its basal width, two-thirds as long as the pronotum, half longer on middle than against eye, disc slightly sloping, flat, with the apex elevated. Face retreating, forming an acute angle with the vertex, front rather broad. Elytra rather short, compressed at the apex, venation weak, irregularly reticulate, the second cross nervure sometimes present.

Colour: vertex and pronotum pale cinereous or milky, heavily and very evenly irrorate with brownish fuscous, except that the anterior margin of the vertex presents six more or less definite dark spots, and the lateral margin of the pronotum is narrowly lined with ivory white. Elytra with the inner halves resembling the pronotum in colour, the outer half on either side milk white, with more or less of brownish reticulation, especially along the costal margin. The brown area on the disc being heaviest along the margin, and shading out towards the suture, the milk white area being continuous with that on the margin of the pronotum and including the claval suture to just before the middle, when it narrows down obliquely to one-half the former width, and becomes obscured by the heavier reticulation toward the tip. Face closely and evenly irrorate with fuscous.

Genitalia: female segment twice the length of the preceding posterior margin, rounding with a rather broad, blunt, slightly bilobed median projection, surface of the segment depressed either side of this tooth; male valve triangular, narrower than the ultimate segment, and about two-thirds its length; plates long, triangular, apices acute, three times the length of the valve.

Described from eight specimens from the National Museum collection, "Los Angeles Co., California, Coquillett collector."

Eutettix fenestrata, n. sp. Form of *pullata* nearly resembling *jucunda*, but more clearly marked. Longer and narrower than either

species. Pale, irregularly maculate with brown; elytra with numerous milk-white spots. Length, ♀, 6 mm.; width, 1.5 mm.

Vertex with the margins almost parallel, two and one-half times wider than long, scarcely half the length of the pronotum; the disc sloping, but slightly depressed, transversely angled with the front, the margin thick and slightly produced. Front longer and narrower than in *jucunda*, the margins nearly straight. Elytra long and narrow, folded at the apex; venation similar to that of *jucunda*, the nervures stronger, central anteapical cell very long, narrow and nearly parallel margined through the median half, where there are three or four rather strong cross reticulations, both ends enlarged, the anterior the larger and somewhat irregular in shape, the posterior sexangular; the claval nervures tied before the middle and the outer one with a cross nervure to the suture.

Colour: vertex pale creamy yellow, a pair of crescentiform spots at the apex, and a pair of dots inside the ocelli black, a narrow transverse band back of these and parallel with the margin, dark at the ends, shading to brown at the middle and spreading out as a wash on the disc. Back of this band are three brownish ovals, the outer ones connected with the margins of the eyes by dark brown dots. Pronotum pale cinereous, with numerous fine irrorations posteriorly, and a few large dark ones on the anterior half. Scutellum orange, washed with brown, four ivory white points and two brown dots on disc. Elytra brown, the nervures still darker, a large number of milky white hyaline spots arranged in transverse bands, one including the first cross nervures, and a broader irregular one across the anteapical cells; the sutural margins darker, with three pairs of equidistant round spots interspaced by the white tips of the claval nervures; the reflexed nervures along the costa broadened and darker brown.

Genitalia: female segment but little longer than the preceding, posterior margin truncate next to lateral angles, the middle half obtusely angularly produced, the apex of which is again produced into a short strap-shaped tooth, not as wide as the ovipositor, its width and length about equal.

Described from a single female from Prof. Cockerell, taken in the Sierra Madre Mts., Mexico, by C. H. T. Townsend.

Eutettix palliolata, n. sp.—Superficially resembling *Thamnotettix areola*, but much broader. Pale lemon yellow, with the pronotum,

scutelium and a narrow sutural stripe extending to the apex of the elytra of a rich testaceous brown. Length, ♀ 6 mm., ♂ 5 mm. ; width, 2 mm.

Vertex longer and flatter than is typical for the genus, over half as long as its basal width, two-thirds the length of the pronotum, half longer on middle than against eye ; front broad, nearly flat above, meeting the vertex in an acute angle, the margin narrow ; pronotum very broad and almost parallel margined. Elytra rather broad, broadly rounding at the apex ; venation obscure, somewhat irregular, a number of veinlets to the costa.

Colour : vertex pale lemon yellow, sometimes slightly greenish and sometimes washed with brown ; pronotum and scutellum cinereous, washed with brown or pale brown, with traces of cinereous lines ; elytra creamy yellow, the scutellar and sutural margins back to the apex narrowly striped with testaceous brown. These stripes are often narrowly margined with white anteriorly, including a narrow lateral margin of pronotum, and contain light spots as follows : a dot at the scutellar angle, a half circle in the margin before the middle of the clavus, a dark-margined spot in an enlargement of the stripe towards the apex of clavus, and a dot or margined spot in each of the first three apical cells. The brown stripes are very narrow at the apex of clavus and then enlarge as the elytra overlap. Face and all below pale creamy yellow.

Genitalia : female segment twice the length of the preceding, truncate posteriorly with the median fourth produced into a blunt tooth half as long as its basal width and slightly notched at the apex ; male valve short, obtusely rounding, plates together spoon-shaped, their apices bluntly rounding and slightly upturned.

Described from eight specimens from the Nat. Museum collection labeled "Tex."

This is a strikingly distinct species, and while not a typical *Eutettix* in the shape of the head, it seems best to place it here for the present at least.

Scaphoideus scrupulosus, n. sp.—Similar to *blandus* and *jucundus* in form. The elytra more flaring and with the general appearance of an *Eutettix*, except for the sharp angled vertex. Pale, with a brown band on base of elytra, another on tip, and a triangular saddle on the disc. Length, 5 mm. ; width, 1.25 mm.

Vertex flat, acutely angular, its length and width about equal, a little longer than pronotum, twice longer on middle than against eye ; face as

in *jucundus*. Elytra moderately long, the venation obscure, and somewhat reticulate in the brown areas, resembling that of *blandus*; costal margin with a large number of nervures as in that species, but in this case they are less regular and slightly oblique.

Colour: vertex pale creamy, sometimes entirely washed with orange fulvous. In clearly marked specimens with a dash each side the apex, a faint line next the margin, and an irregular crescent on the anterior disc. Pronotum milky, with a submarginal row of obscurely infuscate spots anteriorly, and often a few irregular irrorations on the disc; elytra milky subhyaline, with a rather narrow basal band of pale brown, a triangular saddle occupying the posterior half of clavus, and extending out a little on to the corium, of a testaceous brown, often iridescent; the apex of the elytra, including all of the three inner apical cells, of a deep smoky or fuscous. The anterior white band is strictly transverse and parallel margined, and is very definite; only one or two of the principal veins show the brown markings across it. Back of this, however, there is more or less of brown reticulation, often enough to connect the dorsal saddle with the fuscous tip; costal veinlets fuscous; face lemon yellow, anterior and middle femora, except the apices, deep brown.

Genitalia: female segment nearly three times the length of the preceding, the lateral angles broadly rounding to the posterior margin, margin roundingly excavate one-third the distance to the base; from this excavation a long strap-like tooth extends nearly half its length beyond the two rounding lobes of the segment. Male valve obtusely triangular, nearly as long as the parallel margined, ultimate segment; plates long triangular, two and one-half times the length of the valve, their apices slightly produced, and their margins clothed with long hairs.

Described from four females and a male from Los Angeles, Calif. Coquillett collector. Type—Cat. No. (?), U. S. N. M.

This is a strikingly distinct form in this genus, and in several respects suggests the *modesta* group of *Eutettix*.

Thamnotettix collaris, n. sp.—General appearance of *clitellaria*, the saddle longer and narrower, slightly larger and longer than that species, with a much longer and distinctly angled vertex. Length, ♀, 6 mm.; width, 1.75 mm.

Vertex bluntly conical, nearly twice as long on middle as against eye, half as long as its basal width; together with the eyes distinctly narrower

than the pronotum; front narrow, the margins straight, elytra long and closely folded behind, venation indistinct.

Colour: vertex and face creamy yellow, a pair of approximate spots on the apex only partly visible from above, and a narrow basal line on the vertex black. Pronotum behind the eyes ivory white or slightly yellowish-white; that part included between the eyes deep black, scutellum black, elytra black, an elongate saddle extending from the apex of scutellum to the apex of clavus, a yellow stripe along costal margin narrow at the base, gradually widening until it occupies half the corium, then abruptly terminating just before the apical cells; face and all below yellow, the antennal sockets black.

Genitalia: female segment rather long, lateral angles slightly rounding, posterior margin triangularly emarginate, with a median strap-shaped tooth as in *clitellaria*, but shorter.

Described from a single specimen from New York City (H. C. Park).

Thamnotettix mendica, n. sp.—Form and general appearance of *belli*. Larger, and with a longer and more distinctly pointed vertex, with a pair of rather large approximate black spots at the apex. Length, ♀ 6 mm., ♂ 5 mm.; width, 1.75 mm.

Vertex a little over half broader than long, two-thirds longer on middle than against eye, apex slightly conically pointed; front narrow, the margins straight, sloping directly to the clypeus; pronotum over half longer than vertex. Elytra long, inclined to be flaring, venation distinct, similar to that of *belli* and *geminata*.

Colour: vertex yellow, a pair of large triangular approximate black spots on the rounding margin of vertex and front; face pale lemon yellow, the sutures fuscous, a few brown arcs on front not extending up to the black spots. Pronotum white or greenish-white back of the eyes, anterior margin between the eyes brown. Elytra brownish subhyaline, with a coppery reflection, the nervures greenish-white, the costal margin before the apical cells broadly subhyaline white.

Genitalia: female segment half longer than the penultimate, the lateral angles rounding, posterior margin triangularly excavated one-third the depth of the segment. From the bottom of this excavation arises a rather broad strap-shaped tooth, which exceeds the lateral angles; male valve rounding, nearly semicircular, almost as long as the ultimate segment; plates three times the length of the valve, convexly rounding at the base, then concavely narrowing to the acute apices.

Described from five specimens from Fort Collins, Colo., collected by Mr. Van Duzee and the author, and two males from the National Museum, one from Santa Clara Co., the other from Los Angeles Co., Calif., both collected by Coquillett.

The longer and more pointed vertex will at once separate this from any of the numerous varieties of *belli*, *montana* and *geminata*.

Thamnotettix bullata, n.sp.—Somewhat resembling *chiragrica*, smaller and with a narrower head, irregularly pale and fuscous, a pair of large black spots against the eyes in front; elytra with the nervures broadly light. Length, 5 mm.; width, 1.6 mm.

Vertex two and one-half times wider than long, half the length of the pronotum, but little longer on middle than against eyes, roundingly confused with the inflated front, which is broadest across the antennal sockets and abruptly narrows to the clypeus. Elytra considerably longer than abdomen, almost parallel margined, apex obtusely rounding, appendix narrow; venation distinct, the nervures broad, the central anteapical cell extending beyond the other two, and slightly constricted in the middle half.

Colour: vertex pale orange, four dashes on the apex of vertex and front, anterior pair the larger, and a pair of large round spots occupying the entire space between the ocelli and the eyes, black. Pronotum cinereous or milky, more or less irregularly blotched with fuscous; scutellum pale yellow, with two large triangular spots within the basal angles. Elytra sprinkled with brownish fuscous, the nervures broadly white, emphasized on some of the cross nervures; face pale yellow, a few arcs on front brown; antennal sockets and narrow sutural line black; legs and below pale yellow, the ovipositor black.

Genitalia: female segment about half longer than the penultimate, the posterior margin slightly emarginate on either side of a broad median lobe that about equals the slightly acute lateral angles.

Described from three females from Los Angeles Co., Calif.; Coquillett collector. Received from the U. S. Nat. Museum.

This is another of the broad-headed species of *Thamnotettix*, which like *atridorsum* and *chiragrica* are not typical of the genus, and at the same time do not seem to be well placed in *Athysanus*.

Thamnotettix languida, n. sp.—Form of *Kennicotti* and *Coquilletti* nearly, but with a longer vertex and broader form. Darker than *Kennicotti*, with a pair of black spots just over the margin of the vertex and

another pair on the base, a submarginal row on pronotum and a basal row on scutellum. Length, ♀ 6 mm., ♂ 5 mm.; width, almost 2 mm.

Vertex one-half wider than long, half the length of the pronotum, the margins nearly parallel, the apex very slightly conically produced; face but slightly inclined, forming nearly a right angle with the flat, slightly sloping vertex; front broad below, abruptly narrowing to the clypeus; elytra rather broad, compressed behind, giving a wedge-shaped appearance to the insect; venation obscure, similar to that of *Kennicotti*.

Colour: vertex yellow, sometimes washed irregularly with brown, a pair of dashes on base of front visible from above, and a pair of round spots at base black. Pronotum varying from pale or milky to olive fuscous on the disc, the anterior fourth pale yellow, with an irregular band of black spots. Scutellum yellow, with a pair of round dots between a pair of larger triangles of black on the base. Elytra brown or brownish fuscous on the disc, shading out to subhyaline towards the margins posteriorly, the nervures lighter, the claval nervures milky, with the outer part becoming broadly so towards the apex; face pale yellow, a few brownish arcs on the upper part of front below the black dashes, and sometimes a line on clypeus.

Genitalia: female segment nearly twice as long as the preceding, but somewhat narrower, whole segment in the form of a parabolic curve, a second membrane appearing from under the lateral margins and extending back two-thirds the length of the segment; male valve very obtusely triangular, as wide but not over half as long as the apical segment; plates large, broader than the valve at base, and over four times as long, regularly narrowing from just beyond the base to the bluntly rounding apices; margins thick and clothed with weak hairs.

Described from eleven specimens from Los Angeles Co., Calif.; Coquillett collector. Received from the U. S. Nat. Museum.

This species seems to combine in part at least the characters of two different groups in *Thamnotettix*, for while in many ways it resembles *Kennicotti*, in other characters it is allied to some of the green species.

Errhomenellus irroratus, n. sp.—Smaller than *maculatus*, which it much resembles. Stouter bodied, and with a fuller front and more rounding head. Dark brown, irregularly dotted with pale yellow. Length, ♀, 6 mm.; width, 2 mm.

Vertex slightly less than a right angle, the apex blunt, almost twice broader than long, over twice longer on middle than against the small eyes; disc slightly convex, separated from the convex front by a sharp, slightly-curved carina; ocelli a little over their own width back of the carina, and about midway between apex and eye. Front broad, convex in both diameters, clypeus long, its depressed semicircular apex extending beyond the genæ. Pronotum transverse, about equalling length of the vertex, slightly emarginate on the median half posteriorly. Elytra brachypterous, but little longer than the pronotum, truncate or slightly rounding behind, coriaceous obscuring the venation.

Colour: dark reddish brown, vertex irregularly maculate with numerous small, round, yellow spots; pronotum and scutellum with numerous irregular yellow spots. Sometimes a pair of irregular yellow stripes ending on the outer angles of the scutellum. Elytra very sparsely maculate, an irregular blotch on the apical margins just within the costa; abdomen with numerous small spots and a pair of irregular longitudinal stripes yellow; face almost piceous with numerous fine yellow dots.

Genitalia: female segment large, nearly twice longer than penultimate, the posterior margin truncate within the triangularly produced lateral angles, a narrow median incision, back of which the segment is distinctly carinate.

Described from two females from Siskiyou Co., Calif.; collected by Koebele. Received from the U. S. Nat. Museum.

PAGARONIA, n. gen.

Allied to *Errhomenellus* and *Tettigonia*, but with a narrower head than in either. Resembling *Ciccus* in shape of head and pronotum. Head distinctly narrower than pronotum, the eyes small, vertex conical, nearly as long as the pronotum; the front reflexed over the margin as in *Tettigonia*; ocelli small, on the vertex just back of the suture that marks off the reflexed front, and one-third the distance from the eye to the apex. Pronotum short, emarginate behind, angularly inserted between the eyes, the lateral margin carinate, broadening posteriorly in a curve continuous with that of the anterior margin. Elytra longer than the abdomen, venation simple, usually but one anteapical cell—the outer. Face long and narrow, clypeus extending beyond the margin of the genæ; anterior tibiæ simple.

Pagaronia 13-punctata, n. sp.—Green, with thirteen small black spots on head and pronotum, and pale red lines on the elytra. Length, 8–9 mm.; width, 2.25 mm.

Vertex acutely conical, one-fifth wider than long, five-sixths the length of the pronotum, disc flat, sloping slightly toward ocelli, slightly carinate behind, the carina angled near the eye on either side and extending back behind it; pronotum broadest across lateral angles, lateral margins as long as the eye, posterior margin rounding from lateral angles to the scutellum, then emarginate. Elytra longer than the body and rather broad; venation simple, the apical cells twice longer than broad; front much inflated transversely, but slightly narrowing to clypeus.

Colour: pale green, vertex with seven black spots as follows: a pair on the basal suture, a pair just outside and behind the ocelli, a spot on either side the apex and one just before the middle of the disc. Face green, a black spot just under the conical apex of vertex and a pair of smaller ones, often obscure, on the suture just below the ocelli. Pronotum green with three black spots in a row across the disc, the outer pair on a line behind the eyes, the median one behind the middle of the pronotum. Elytra greenish subhyaline, sometimes with pale reddish lines between the nervures.

Genitalia: female segment as long as the penultimate, the posterior margin very slightly produced, elevated in the middle, almost carinate, often giving the appearance of a slight notch; male valve usually entirely concealed, plates long and finger-like, three times as long as their combined basal width, over twice the length of the apical segment, narrowing toward the apex and sparsely clothed with weak spines.

Described from nine specimens from Los Angeles Co., Calif. (collected by Koebele and Coquillett); three from Pasadena, Calif. (H. C. Fall), and three from Marin Co., Calif. (C. Fuchs).

Pagaronia 13-punctata, var. *triunata*, n. var.—Size and structure of the species: Colour dirty straw yellow, sometimes washed with reddish; vertex with all seven spots of the preceding species enlarged and somewhat irregular, the posterior pair on the disc near the margin instead of being in the suture, an elongate dash on the reflexed portion of front on either side, about midway between the apical spots and the pair

against the ocelli. Front with twelve pairs of distinct fuscous arcs which emit a broad definitely-margined stripe of yellow bearing a black spot above. Pronotum with a submarginal row of irregular spots, heaviest near the margin. Elytra sometimes of a unicolorous dirty straw, sometimes pale yellow, with the spaces between the nervures scarlet, except along the costa.

Described from four specimens from Santa Clara Co., Calif. (Coquillett), and three from Santa Cruz Co., Calif. (Koebele).

This is a very puzzling form and seems in several characters to connect the *Tettigonidæ* with the *Jassidæ* through some of the lower forms in that group.

Paropulopa interrupta, n. sp.—Form of *M. scanicus* nearly, slightly smaller, vertex flat and not extending behind the eyes; colour very variable, usually pale straw with interrupted fuscous markings on pronotum and elytral nervures. Length, 2.5–3 mm.; width, 1.25 mm.

Vertex flat or slightly depressed on the disc, deeply, coarsely pitted, a little over twice as long on middle as next eye, two and one-half to three times wider than long, the anterior margin rounding or bluntly angulate, face retreating, forming a very acute angle with vertex. Front flat, slightly depressed above, broadest across the antennal pits, from which ridges extend nearly to the apex, forming shallow pits between these and the vertex margin in which the ocelli are located. Whole face deeply pitted, ocelli slightly nearer each other than the eyes, clypeus rounding at the apex and extending some distance beyond the genæ. Pronotum with the entire posterior margin nearly straight, anterior and lateral margins in a broad curve. Elytra coriaceous, apex bluntly angular, nervures raised, distinct, cells somewhat irregular, often a few extra nervures along costa, a cross nervure between the sectors before the anteapical cells and often two behind this opposite the anteapical cells.

Colour: very variable, often pale straw, with more or less of fuscous markings on pronotum and with the nervures and margins of elytra interruptedly fuscous, sometimes these marks are arranged in the form of oblique bands. Sometimes the whole insect is of a rather uniform brownish fuscous and sometimes of a tawny reddish shade, the punctures on pronotum are usually dark marked.

Genitalia: female segment shorter than the penultimate, the posterior margin trianguarly emarginate from the lateral angles clear to

the base in the middle, so that all that is visible of this segment is a triangular strip on either side from under the margin of which another more broadly triangular strip is exposed; male, ultimate segment very large, valve transverse, one-half as wide and one-third as long, the posterior margin truncate, plates as wide as the valve and nearly four times as long, apparently united for more than half their length, the apices broad and individually rounding.

Described from nine specimens from Los Angeles Co., Calif. (Coquillett and Koebele), and four specimens from Pasadena, Calif. (H. C. Fall).

This, and the following species, introduce a new subfamily into the American fauna. It remains only to discover a *Ledra* and a *Ulopa* and we shall have all the European groups represented.

Paropulopa Mexicana, n. sp.—Resembling *interrupta*, but larger. Front distinctly convex, elytra long and narrow. Pale testaceous brown with fuscous pitting. Length, 3.5 mm.; width, 1.25 mm.

Vertex slightly longer and more angular than in the preceding form, fuller and less sharply angled with the vertex. Front full and distinctly convex, a slight depression under the apex of vertex, the carinæ under the ocelli very faint. Pronotum shorter and broader than in *interrupta*, the posterior margin straight. Elytra long, regularly tapering from both margins, coriaceous, the claval suture often indistinct; the venation similar to *interrupta*, but weak and irregular posteriorly, no cross nervure between the sectors before the anteapical cells.

Colour: testaceous brown, with more or less of fuscous on vertex and pronotum, chiefly in the coarse pits.

Genitalia: female segment two and one-half times the length of the penultimate, the lateral margins parallel to the middle, then suddenly narrowed one-fourth the width of the segment and again parallel; posterior margin truncate or roundingly emarginate, with an open median notch.

Described from two females from the Sierra Madre Mts., Chihuahua, Mex. Alt. about 7,500 ft. Collected by C. H. T. Townsend, and sent by T. D. A. Cockerell.

NOTES ON THE LARVÆ OF *ARCTIA VIRGO*, LINN.

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In Dr. Dyar's "Preliminary Notes on the Larvæ of the Genus Arctia" (Jour. N. Y. Ent. Soc., March, 1900), some interesting remarks are made in reference to the larvæ of *Arctia virgo*, as to the stage in which the larvæ hibernate, and if they ever possess a dorsal stripe.

Through the kindness of the late Mr. T. G. Priddey, of Toronto, we received on the 10th April, 1901, three larvæ of *A. virgo*, collected by him on the 5th April. Writing under date of the 8th April to Dr. Fletcher, Mr. Priddey says: "I shall probably get more larvæ, but even now the bank under the grass where they hibernate is quite solid ice." The three specimens only moulted once before maturity, viz., on the 26th April, 30th April, and 8th May, respectively; so these, at any rate, hibernated in the penultimate stage. Mr. Dwight Brainerd tells me that "at Montreal, *A. virgo* generally hibernates in its second to last skin; that is, it sheds its skin twice in the spring before going into pupation." He also states that he has found specimens in the fall in the penultimate stage. In the Annual Report of the Entomological Society of Ontario for 1896, on page 13, Dr. Fyles mentions that in the spring of 1891 he collected larvæ of this species at South Quebec, which moulted on the 4th May and again on the 20th May, the moths emerging on the 10th July.

With regard to the dorsal stripe, the following description of the full-grown larva, with the appended notes, will show that all the three specimens received from Mr. Priddey possessed this character:

Length, just after last moult (30th April, 1901), 35 mm. Beautiful deep black larva, with bunches of stout black bristles from tubercles on dorsum, and reddish bristles from tubercles on lower portion of sides and on venter, and a striking dorsal stripe of bright yellow distinct on all segments but 2 and 13. Head 3.6 mm. wide, shiny black, with lobes full, slightly furrowed at vertex, sparsely covered with short and long black hairs; mouth-parts and ocelli black; antennæ reddish-brown. Whole skin of body deep velvety black. Tubercles conspicuous, bearing bunches of distinctly barbed bristles. The bristles from tubercle iv and from all tubercles above spiracles are deep black. On most segments the majority of the bristles from tubercle v are bright rust-red, those from the upper portion of tubercle only being black. The

bristles from all tubercles below v are bright rust-red. Tubercle i about one-half the size of ii; ii has a shining base. Tubercles i, ii and iii are black, iv behind and almost touching the spiracle very slightly reddish, v and vi distinctly reddish, vii and viii on venter black. Spiracles yellowish-white. The thoracic feet are shiny black outside, lighter inside, tipped with pale brown and bear black and light-brownish bristles. The prolegs are brownish-red, and bear many rust-red bristles. On segment 2 there are several long thin hairs, not barbed, which slope forward and hang down in front of the head. On segments 11, 12 and 13 are also some long hairs, which are faintly barbed.

Two days after moulting the spiracles had changed to a bright orange. Five days after moulting the dorsal stripe was less conspicuous, being quite bright on and near middle of each segment, but faint (whitish) near division of segments. Eleven days after moulting the dorsal stripe was creamy white, expanded somewhat in the middle of each segment.

Length of mature larva 55 mm., extended 60 mm.; width at widest part, 8.5 mm.

Two other specimens of the mature larva differed somewhat from the one from which the above description was drawn. This difference was chiefly in the colour of the tubercles. In one of the specimens, tubercles iv, v and vi were partly whitish, vii and viii being black as above. In the other specimen, tubercle iii on abdominal segments, dorsal tubercles on segments 3 and 4 and tubercles vii and viii were all reddish. In this latter specimen tubercle ii, which was black, changed to reddish on all segments but 11, 12 and 13. The dorsal stripe was distinct in both of these specimens, in the one case the colour being a dirty whitish, and in the other a beautiful orange-yellow, distinct on all segments. On segment 2 in this latter specimen the bristles from the front half of the dorsal tubercles were bright rust-red, the same as those from tubercles below spiracles, as well as nearly all the bristles from lower half of tubercle iv, and the median suture of head was white.

Mr. R. J. Crew, of Toronto, who has bred *A. virgo*, tells me that about half of all the larvæ he reared had the dorsal stripe. Mr. Brainerd has also found the dorsal stripe to be common, and states that "a larva of *A. virgo* with red spiracles in one skin will often have them jet black in the next."

On the morning of the 16th May one larva began to make its cocoon, which was very slight, being simply some leaves drawn together and fastened by a few threads of silk. By the morning of the 22nd May the larva had changed to pupa. Another began to spin on the 22nd May.

and by the 29th had changed to pupa. The third specimen was inflated. The first moth emerged on the 15th June, and the second on the 20th June. At Ottawa the moths have been taken during the second week of July, and at Toronto the writer has collected specimens at the electric lights about the same time.

Pupa.—Length, 29 mm.; width at widest part, 10.75 mm.; black, yellowish-brown in folds of abdomen, pruinose, as if the pupa had been heavily frosted—whole surface roughened. Abdomen and thorax sparsely covered with short black bristles. Spiracles black, shiny, conspicuous. Cremaster rough, shiny at base, hollowed below, bristles capitate, reddish brown. The pupa when first formed is reddish-yellow on dorsum of thorax; wing-cases dull yellow. The ground colour of the abdomen is reddish, the segments are ringed with black, and in folds of segments there is much white.

DR. HERMAN STRECKER.

Dr. Herman Strecker, a widely-known sculptor, and one of the leading entomologists of America, died on the morning of Nov. 30, at his home in Reading, Pa.

He was stricken with apoplexy on the evening of the 29th of November, and passed away without regaining consciousness. He was in the 65th year of his age.

Dr. Strecker was of German descent, and was born in Philadelphia, March 24, 1836. He inherited his fondness for scientific studies, and evinced this inclination at an early age. On his mother's side were three naturalists of note. They were Benjamin, Edward and Richard Kern.

He was an architect, designer and sculptor by profession. He located in Reading when a boy, having accompanied his father, who was a prominent dealer and worker in marble, at that time. Since then he followed the pursuit of his father. As a sculptor he gained a wide and enviable reputation. He produced many praiseworthy works of art.

He began his work as an artist and sculptor in his 12th year, and laboured hard ever since. All his literary and scientific work, the immense correspondence attending the making of his collection, was done at night, his vocation as a sculptor taking up his daylight hours.

He travelled a great deal, and in 1855–56 visited many islands in the West Indies. He also travelled in Mexico and Central America, to examine the old Aztec monuments, as well as to add to his collection.

Dr. Strecker was one of the most eminent authorities on the Lepidoptera in America. He was well versed in some of the dead languages, and a master of many living foreign tongues, in which works of his special pursuit are written. He owned the largest, most remarkable and in every way the most valuable collection on the American continent. It is said that there are but few in the world that surpass it. The Strecker collection contains over 200,000 specimens, gathered from every portion of the globe.

In consideration of his scientific work and knowledge, the degree of Ph. D. was conferred upon him by Franklin and Marshall College.

In his earlier days Dr. Strecker made frequent trips to Philadelphia, studying at the Phila. Acad. of Nat. Sciences all branches of natural history, but later devoted all his time to entomology, and finally to macrolepidoptera.

He published numerous works on Lepidoptera, for which he drew and coloured the plates himself. His principal work, long out of print, was "Native and Exotic Butterflies and Moths."

He published the work under difficult circumstances; he was a poor man at the time. He saved sufficient money to buy a lithographic stone, and then drew the group of butterflies on the first page of the work. This was sent to Philadelphia, printed and then returned. When the stone came back he repolished it and drew upon it another group. In this way the stone travelled to and from Philadelphia, until all the plates were published. All the copies were sold. The demand increased, but no more were ever issued.

The collection is contained in many glass-covered drawers, and each specimen is labelled as to locality, etc. The collection cost many thousands of dollars. An attempt to describe the collection would be useless, but many extremely rare and valuable flies are contained therein. Upwards of 300 types and an equal number of co-types are in the collection. It is one of the most remarkable collections in the world in regard to aberrant and dimorphic forms.

Dr. Strecker was constantly visited by men of science from all parts of the world.

In his social relations he was cordial and affable, a genial friend and a good neighbour. He was reserved and unassuming in speaking of his own achievements. In his chosen field he ranked deservedly high.

The scientific world loses one whom it can ill spare. He left a widow, son and daughter. LEVI W. MENGEL, Reading, Pa.

SYNONYMIC NOTES.

BY HENRY H. LYMAN, M. A., MONTREAL.

In 1834 Dejean proposed the name Euchætes for a genus of Coleoptera, and it had thus been preoccupied for seven years when Harris used it in 1841 for the moth named by Drury, *Bombyx Egle*.

In 1858 it was used for a third time by Sclater for a genus of birds, and in 1876 Leconte described another genus of Coleoptera under this same much-used name.

As it is a well-known rule of nomenclature that a generic name can be used only once in the animal kingdom, all subsequent use of the term for other genera is erroneous and must cease.

It therefore becomes necessary to give other names, and I propose the name EUCHÆTIAS, from a kindred Greek word, for the genus erected by Harris. It is not necessary for me to define the genus, as it is well known, and this is merely a necessary change of name, the type, of course, being *Egle*, Drury.

For the genus erected by Leconte, I would suggest the name EPEUCHÆTES, the type being *Echidna*, Lec.

Leconte's genus was described very fully in Proc. Amer. Phil. Soc., XV., 319, and the type species on page 320.

In view of what I said in my first presidential address on the subject of changes in generic names, it is perhaps the irony of fate that it should fall to my lot to myself make changes of this nature, but I can at least plead in extenuation, as the woman in the story did of her baby, that they are only very little ones.

Recently, in working over my Notodontidæ I made a rather curious discovery, namely, that the true *Angulosa*, S. & A., is the species which stands in our catalogues as *Georgica*, H.-S. On plate 83, which, by the way, in the English page of the text is erroneously numbered LXXVIII., are shown two moths, a ♂ and ♀, the former of which can only represent *Georgica*, while the latter is doubtless intended for the species which we have been calling *Angulosa*, as its larva feeds on oak, though it really, in my copy at least, looks more like *Ferruginea*, Pack., the larva of which, however, feeds on birch. But this ♀ is figured merely as a colour variety of *Angulosa*, as in the text it is said "the female in the figure is a variety of colour, most of that sex being coloured like the male."

It therefore necessarily follows that the male of the plate, and its proper female, which is described, but not figured, is the true *Angulosa*, S. & A., of which *Georgica*, H.-S., is a synonym, and that what we have called *Angulosa* has never been properly described and named, but as these moths have been so long known under these names, it is probably best to allow them to stand as they are, as no injustice is thereby done, and the female of the species now known as *Angulosa* was figured by Smith and Abbot, though erroneously, under that name.

THE SCIENTIFIC NAME OF THE CHERRY FRUIT-FLY.

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

In September, 1899, I published an account of a new cherry pest, which I called the cherry fruit-fly (Bulletin 172, Cornell Experiment Station). As stated on pp. 31 and 32 of this bulletin, the identity of the adult insect had not then been established, although the evidence strongly indicated that it was the fly known as *Rhagoletis cingulata*, Loew. I kept my breeding cages containing the hibernating puparia of the insect in the warm greenhouse or insectary all winter, and on March 9th, 1900, the first cherry fruit-fly emerged. It did not disappoint my expectations, for it demonstrated beyond further doubt that this new cherry-fruit pest is *Rhagoletis cingulata*, Loew. By May 31st nine more of the flies had emerged, and then cherries near the insectary were nearly half grown. The flies continued to emerge until July 11th in my cages, and on June 30th I received word from Geneva that they were abundant about the trees where the fruit was ripening. This correspondent caught quite a number of the flies with sticky fly-paper hung on a shingle in a tree ; he said they seemed to be attracted to any bright-coloured thing like a new straw hat.

Since the Bulletin was written, I have received evidence to indicate that the pest had been destructive during the preceding three to five years at Bonaparte, Iowa ; Westboro, Mass.; State College, Pa.; Batavia, Syracuse, Portland, and Cataraugus, N. Y. Correspondents at Westboro, Mass., and Clifton Springs, N. Y., think that the same insect worked in their cherries at least thirty-five years ago.

Considerable damage was done by the insect in New York in 1900, but we heard little of it in 1901.

Mailed January 10th, 1902.

The Canadian Entomologist.

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THREE NEW NOCTUIDS FROM BRITISH NORTH AMERICA.

BY JOHN B. SMITH, SC. D., RUTGERS COLLEGE, NEW BRUNSWICK, N. J.

To the courtesy of some of my correspondents from British North America I owe a series of specimens, some of which proved undescribed. The species sent by Dr. Fletcher is of some economic importance, and its prompt description seems desirable. The other species have been in MSS. for some time, and were intended to form part of a lengthy descriptive paper. Their publication together at this time gives this contribution a somewhat faunal character.

Semiophora Youngii, n. sp.—Ground colour varies from carneous gray to smoky brown, variably powdered with black or suffused by darker shadings. Front of head and tips of palpi always gray; sides of palpi blackish brown. Male antennæ with lengthy, slender, yellowish pectinations. Collar inferiorly rusty red or brown, surmounted by a blackish or darker line or band, and more or less obviously gray tipped. Discal tufting gray or at least paler than ground; patagiæ a little gray speckled. Primaries with all the usual maculation well defined. Basal half line black, single, twice dentate, followed by a gray shade line. Between this line and base is a gray powdering, always obvious and sometimes prominent; beyond it on the sub-costal is another less prominent shading, which extends to the t. a. line. T. a. line geminate, more or less broken, upright or a little outcurved, outcurved in the interspaces, though not prominently so. Outer line black, inner line obscure, scarcely defined, intermediate space gray. In one example the gray included space only is visible. T. p. line geminate, evenly outcurved over the cell, inwardly oblique, or with only a slight incurve to the inner margin. Inner line black or blackish, lunulate, outer line smoky, even; included space gray,

cut with black on the veins. S. t. line irregular yellowish or gray, punctiform or continuous, preceded by a darker brown to black shading, the terminal space usually paler. A series of brown or blackish interspaceal terminal lunules. Orbicular rather large, oval, somewhat oblique, concolorous or a little paler, rather prominently ringed in yellowish or gray. Reniform moderate in size, kidney shaped, gray or yellowish ringed, more or less pale powdered, and sometimes completely yellowish. No claviform. Secondaries rather even smoky brown, with a reddish tinge in the male, especially defined on the fringes. Beneath rosy gray to reddish; primaries with disk smoky, secondaries paler basally and powdery. A common extra discal line. Primaries with the s. t. line marked; secondaries with a discal spot. The male is more coppery red than the female.

Expands 1.30–1.50 inches = 32–37 mm.

Habitat.—Mer Bleue, near Ottawa, Ontario, Canada; Mr. C. H. Young.

Two males and five females, and each different from every other. One male is almost uniformly carneous gray, the lines are not prominent, the reniform contrasting yellowish. One female is evenly blackish brown, the median lines reduced to the pale included spaces, and the ordinary spots narrowly pale ringed. A third form has all the maculation sharply defined as described, and the terminal space is decidedly paler than the rest of the wing. Between these three types the variation ranges. The cell may be also darker, even blackish, or may be entirely concolorous with the remainder of the wing. One specimen recalls *Platagrotis condita*, another resembles *Adelphagrotis stellaris*.

The specimens were sent me by Dr. Fletcher, who tells me that he knows the early stages, and that Mr. Young has bred some of the examples submitted to me. It will be his pleasure to add to the history of this unusually variable and interesting species. The dates on the specimens before me range from August 19 to September 7.

Carneades infusa, n. sp.—Ground colour smoky brown, varying a little to a violaceous shading. Head and collar a little paler, the latter with a slender obscure black transverse line. Thorax concolorous, posterior tuft tending to become a little discoloured. Primaries with costa a little paler, tending to yellowish at the base, not discoloured or strongly contrasting. The median lines are practically wanting. A curved black mark at base below median vein does not quite reach the place of the t. a. line. T. a. line marked by a black spot in the cell, by a cross-line closing

the claviform, and by a series of more or less evident black scales below that point. Claviform narrow, not quite reaching the middle of median space, black ringed, the lines almost touching. T. p. line marked over the cell by a slight difference in tint between median and s. t. space, below that lost or barely traceable. S. t. line barely traceable. Orbicular irregular, black ringed, paler centered. Reniform large, broad, only a little constricted, hardly kidney shaped, black ringed, pale centered; both spots appearing slightly discoloured. The cell before, between and beyond the spots is blackish. Secondaries whitish, with a smoky outer border. Beneath powdery, the primaries gray, secondaries whitish, no obvious maculation.

Expands 30–31 mm. = 1.20–1.24 inches.

Habitat.—Cartwright, Manitoba; Black Hills, Wyoming.

Two indifferent males only are before me at present; but I have had other and better specimens of both sexes. The species is really *obeliscoides* without the contrasting costa and with the t. p. line lost so that there is an almost even shade below the cell from t. a. line to outer margin; the terminal space being scarcely deeper. The ground colour and general variation in tint are as in *obeliscoides*, but the species is perceptibly smaller. It is type 4368 U. S. N. M.

Hyppa Brunneicrista, n. sp.—General form and maculation of *xylinoides*, but darker throughout, more blackish gray in tinge. A rich deep brown shade extends longitudinally through the centre of the primaries toward the apex. Secondaries smoky blackish, somewhat paler basally, but with no trace of yellow as in the common species. The sides of the thorax are solid dark chestnut brown, while in *xylinoides* there is a light brown centre with a black border. Posterior thoracic tuft rusty brown. Abdomen blackish, without trace of yellowish tinge. In the s. t. space of the primaries there is a rusty brown shade from inner margin, prominent opposite anal angle, and gradually merging into the ground. Beneath uniformly darker and more powdery than in the known species.

Expands 40–42 mm. = 1.60–1.68 inches.

Habitat.—Calgary, Alberta, Head of Pine Creek, June 19, 22, July 2; F. H. Wolley Dod.

One male and two females are now before me, and Mr. Dod has as many more. He wrote under date March 9, 1901: "Evidently a distinct species, entirely overlooked until a week ago when I was rearranging and relabelling my entire collection. I had looked on it as a mere seasonal

dark form, but now find I took both forms in the same seasons. * * * * The ♂ antennæ are obviously different, and this has a rusty patch on basal tuft of thorax, and differs also in the anal angle of the primaries and colour of secondaries. These differences are *quite constant* in my series." The antennal difference referred to by Mr. Dod is in the greater length of the pectinations in this new species, and this is accompanied by an even greater difference in the male genitalia. Though fully as large as *xylinoides*, this new species has the male harpes actually smaller, while the clasper and other processes are quite unlike.

HYDROECIA AMERICANA SPEYER, OR HYDROECIA ATLANTICA SMITH.

To whom should a species be credited: to the author who names it a variety and declares positively that it is not distinct from another, which he considers the stem, or to the author who first points out the specific characters and establishes its distinctness?

In 1875 Dr. A. Speyer, in his paper on "Europäisch-amerikanische Verwandschaften," gives first, a list of American species which he considers distinct from European forms, a list of species occurring in both countries, a list of questionable forms, and then elaborates these lists by a series of notes. In the list of species common to both countries, he enumerates *Hydroecia nictitans*, and afterwards points out some minor differences in the series before him, noting that Guenée had previously enumerated most of them. On page 152 of the volume he speaks as follows: "Als eigene Art wird sich die amerikanische Nictitans von der europaischen nicht trennen lassen, da ein völlig durchgreifender Unterschied zwischen beiden fehlt. Eine ausgezeichnete Varietat bildet sie aber jedenfalls."

And then he characterizes his variety as follows:

"Var. b. Americana. Al. ant. lætius latericiis s. fulvis, apice subfalcato. Patr. Amer. Septentr."

We have, then, very clearly established what Speyer thought of the American form. First, he ranges it as identical with the European; next he declares that there is no constant difference between the examples from both countries, hence specific separation is impossible, and, finally, he bases a varietal name on a slight difference in general colour and

outline of the fore wings. He marks it "Var. b.," evidently considering *erythrostigma* as "Var. a.," though it is not so quoted.

Did Speyer describe a new species by this process? He specifically declares that he does not, and states positively that the characters noted by him are not constant. In the latter point he is correct, for, based on his description, the name has absolutely no standing.

Of this opinion was Mr. Grote, for in his list of 1882 he cites *nictitans*, Bkh., with two varieties—*erythrostigma*, Haw., and *lucens*, Tr. Speyer's *Americana* is not cited at all, hence it was evidently considered a synonym, for Mr. Grote certainly knew of Speyer's paper.

In 1899, after a thorough study of the species of *Hydroecia*, I pointed out a positive structural difference between the *nictitans* of Europe and the form that had received that name here. I was the first to claim specific standing for the American form, and the first to point out its characters. Why am I not entitled to the species? To call it by Speyer's name would credit him with something he never did, and would give him a species he never recognized, based upon the work done by me twenty-four years later.

The rule of priority is a great thing, but a little justice in its application is not entirely undesirable.

I am aware that this position is not entirely in accord with Canon XXVII. of the A. O. U. Code, but it is nevertheless a fact that my name *atlantica* is the first ever applied to the American species resembling the European *nictitans*.

JOHN B. SMITH.

A FEW NOTES ON THE LEPIDOPTERA OF 1901 IN SOUTHERN MANITOBA.

BY E. FIRMSTONE HEATH, CARTWRIGHT, MAN.

It is very curious and interesting to observe the waves of insect life that annually pass over this district. For instance, some four years ago the genus Acronycta was strongly represented in some ten or twelve species. The following season that genus almost disappeared, and its place was taken by the old genus Agrotis, with its now numerous subdivisions. Last year the various species of the genus Carneades were certainly in the ascendant, and occasionally there comes a year like this, when perhaps only an odd species or two show up in any quantity, as was the case more particularly with *Carneades pityochrous*, and while most of

the great genera were almost entirely absent, one's labours were rewarded by the capture of a few specimens of species comparatively rare hereabouts.

The butterflies started with a great show of "Painted Ladies," *Pyrameis cardui* (I do not think its name has been changed lately), apparently hibernated specimens. Where they came from is somewhat of a mystery, as I do not recollect noticing many during the previous year. Owing to a succession of cold and frosty nights during May and the early part of June, insect life received a check, and very few butterflies were visible, even of what are our commonest species. The Theclas and Pamphilas, usually abundant, were absent in nearly all species, and the show of "Blues" was very meagre. *Pieris rapæ* was rather more numerous than usual, and the finding of an occasional larva in a dish of cabbage made one for the moment almost fancy oneself once more in England. This butterfly is certainly increasing in numbers, and before long may become troublesome here. The only butterfly that was at all numerous in September was *Grapta progne*, and I did not see one of the other species of the genus that are usually equally abundant.

Among the Noctuids, my first capture of any importance was a nice series of all the varieties of *Homoglæa hircina*, both at light and at sugar. This moth has in past seasons been rather a rarity with me, and, with the exception of a single *Tæniocampa subterminata*, was the only early species taken.

On May 12th I took a single specimen of *Biston ursarius*, a moth I have not seen for many years. On May 14th I netted a dozen or so of moths—and could have taken many more—flying, in the dusk, about some wild plum trees that were then in bloom, and much to my disgust I found them to be nothing but worn, hibernated *Peridroma saucia*. Where did they come from? *P. saucia* was not in unusual numbers the year before, and I have very seldom taken any at this early date in previous years. Currant bloom (the wild black) did not yield anything like its normal harvest. *Cucullia intermedia* was very scarce. *Mamestra Farnhami* was not so numerous as usual, but, besides *Plusia simplex*, which is always to the front, I took some half dozen of *Plusia precationis*, a very scarce moth here, and one that I have only before taken in single specimens, at light, in August. So long as the plums, cherries and *Amelanchier Canadense* remained in bloom, sugar had no charms, and my sugared trees remained unproductive till quite late in the season, the only

captures I made being at light, on the few damp, warm evenings that were vouchsafed me.

The Sphingidæ appeared in their usual species and quantity. June 20th was rather a red-letter night in my diary, as I took at light a very fine Cossus, which seems different to any in my collection. I believe this to be a rather notable catch; at all events, it is so to me. The few specimens I have were reared from larvæ found frozen in firewood during the winter, but I find them very difficult to feed to maturity. From the number of larvæ there seen, I should expect the moth to be far more in evidence, but it seems to be of a very retiring disposition, and conceals its beauties from vulgar gaze. Although Noctuids were very scarce, some specimens of Geometers and "Micros" generally were more than ordinarily abundant. I must have added some fifteen or twenty species, which are as yet undetermined, to my collection.

In August, sugar proved more attractive, though nothing very special turned up. In a note to Mr. Hanham's list of our Manitoban moths, recently published in the CANADIAN ENTOMOLOGIST, Dr. J. B. Smith says that from material furnished by myself he thought that *Carneades incallida* and *C. quinquelinea* must be taken as one species. I thought so too at the time, but further observation of a long series of living specimens induces me to think that a separation can be made into two groups. One, which I take to be *C. incallida*, has rather broader primaries of a dull, nearly white, colour, with the lines pale and indistinct. The other group, *Carneades quinquelinea*, has the primaries slightly narrower and of a more glossy, bluish-white colour, with the lines strongly marked. Besides these groups there is a residuum of old worn specimens of which it is very difficult to say to which species they belong.

Many of our usual autumn Geometers were absent, but I was pleased to take two or three *Hybernia tiliaria*, a moth I have not seen for many years.

A few species of Hydrœcia came to light, among them being single specimens of *nelita*, Strecker, and *frigida*, Smith, and also *cataphracta*, which last is new to the Manitoban list.

The autumn Plusias were altogether wanting.

That curious moth, so singular in its habits, *Ufeus plicatus*, has been more than commonly numerous. I have only taken a single specimen outside the house at light, but inside, from October to the beginning of

December, according as the weather was mild or otherwise, I have taken from six to a dozen annually.

No particular case of insect damage came under my notice. The grasshoppers have not reached us, and our soil is too heavy for them to flourish thereon. Our very severe winters and late frosts in May and June seem to keep all insect life in due bounds, but the latter are also detrimental to our crops.

THE UNITED STATES NATIONAL MUSEUM.

The following census of the Lepidoptera in the U. S. National Museum was made in December, 1901:

	No. of specimens.	No. of species.	No. of inflated larvæ.	No. of types.
Butterflies	15,606	2,408	290	29
Sphingidæ	1,214	251	109	0
Saturnians	882	168	170	1
Arctians and allies	4,756	863	402	48
Noctuidæ	16,807	2,367	545	509
Lasiocampidæ, Notodontidæ, etc.	3,390	505	687	17
Geometridæ	8,727	1,233	449	103
Sesiidæ, Limacodidæ, etc.	2,582	471	172	29
Pyralidæ and Pterophoridæ	9,216	1,366	111	47
Tortricidæ	4,940	724	77	33
Tineidæ (sens. lat.)	12,146	1,797	56	179
Material not yet placed in the regular collection	19,266	(est.) 500	421	251
Alcoholic larvæ	(est.) 5,000	...	....	....
Pupæ, cocoons, etc.	(est.) 3,000	.....	....	....
Duplicates	18,560	.....	208	....
	126,092	12,653	3,697	1,246
Add inflated larvæ as above	3,697			
Total number of specimens	129,789			

Comparison with other American collections is invited.

HARRISON G. DYAR.

COLORADO BOMBIDÆ.

BY E. S. G. TITUS, URBANA, ILL.

During 1900–01 I made some studies on the Bombidæ occurring in Colorado. This paper is an abstract of those studies, the main body of which is in an unpublished thesis deposited with the Secretary of the State Board of Agriculture at Ft. Collins, Colorado. The material used is in the collection at the State Agricultural College of Colorado, and in my own collection; also a few specimens at the U. S. Nat. Mus. Most of the collection passed through the hands of Mr. Wm. H. Ashmead, who corrected determinations and who very kindly looked over the table given below, not only making corrections in it, but adding some species I had not recognized.

It will, of course, be understood that *colour characters* referred to in the table *always* mean *colour of pubescence.*

Table of Species.

I.—Abdomen without orange-red band.

Dorsum of thorax generally entirely yellow.

A. Apex of abdomen black.

First segment yellow, rest black ..... *Virginicus.*

First segment yellow, next three fulvous ..... *dorsalis.*

First two segments yellow, rest black ..... *vagans.*

First two and basal middle of third segment yellow, rest black ..... *Morrisonii*, ♀.

First three segments bright lemon-yellow, rest glossy black ..... *perplexus*, ♂.

First three and middle of fourth segment yellow, rest black ..... *Morrisonii*, ♂.

AA. Apex of abdomen fulvous.

First three segments yellow, rest, except apex, black ..... var. *Hudsonicus*, ♂.

Dorsum of thorax more or less black on the disk.

A. Apex of abdomen black.

First segment yellow, basal middle of second yellow or tawny, rest black ..... *separatus.*

First three segments yellow, rest black ..... *Nevadensis*, ♀.

AA. Apex of abdomen black and fulvous.

First three segments yellow ..... *Nevadensis*, ♂.

Dorsum of thorax banded with black.

A. Thorax before the band white ..... *appositus.*

AA. Thorax before the band yellow, scutellum yellow.

B. Apex of abdomen black.

First segment and second (except basal middle) yellow ..... *affinis.*

First, second partly, and fourth segments yellow, rest black ..... *Edwardsii.*

First and second segments yellow ..... *scutellaris*, ♀.

First four segments yellow ..... *fervidus*, ♀.

First four segments lemon-yellow ..... *sonorus*, ♀.

First, second, fourth and fifth (partly) yellow.

Venter nearly bare ..... *Putnamii*, ♀.

Venter and legs with long yellowish hairs .. *Putnamii*, ♂.

BB. Apex white.

First two segments black, third fulvous, fourth to sixth segments white ..... *Coloradensis*, ♀, var. nov.

First two and fourth segments black ..... *proximus.*

First, second partly, and fourth segments black .. *Howardii.*

BBB. Abdomen, except apex, ochreous or yellow.

Apex tufted with black, wings uniformly fuscous ..... *fervidus*, ♂.

Apex fulvous or fulvous-yellow, wings subhyaline basally, broadly fuscous at apical third ..... *Pennsylvanicus*, ♂.

AAA. Thorax before the band yellow, scutellum more or less black.

First segment black, vertex with two yellow patches. *terricola*, ♀.

First segment partly yellow, vertex all black .. *Pennsylvanicus*, ♀.

" All the dorsal segments clothed with a fulvous pubescence " ..... *Titusi*, n. sp., Ashmead.

II.—Abdomen with a more or less distinct orange-red band.

Dorsum of thorax more or less distinctly banded with black.

A. Apex of abdomen black or nearly so.

B. First and fourth segments, second at least partly, and third segment entirely, orange-red.

C. Scutellum all yellow.

Second segment all orange-red, face yellow ..... *ternarius.*

Second segment orange-red, face pale, black hairs above antennæ ..... *sylvicola.*

Second segment with basal middle yellow ..... *rufocinctus.*

CC. Scutellum and second segment partly black, remainder of second segment orange-red ..... *bifarius.*

BB. First two segments yellow, third and fourth orange-red.

Scutellum all yellow ..... *juxtus.*

Scutellum partly black, thorax anteriorly mixed with black ..... *flavifrons.*

AA. Apex of abdomen not entirely black.

Apex of abdomen orange-red, first two segments yellow, third black ..... *Oregonensis*, ♀.

Apex of abdomen not so bright, some yellow mixed with fulvous colour ..... *Couperii.*

Dorsum of thorax with mixed pubescence.

First two segments pale, third black, apex orange-red ..... *mixtus.*

All localities in the following list are in Colorado, except where otherwise stated.

B. dorsalis, Cress., 1878.

Mr. Ashmead, in looking over my table, has written in "First segment yellow, 2, 3 and 4 fulvous ..... dorsalis, ♀." I have not seen the specimens the note was upon.

B. separatus, Cress., 1863.

♀ June, ♀ July 20, August 8 (C. Stannard) at Ft. Collins: ♂ Henderson, August 30 (Gillette).

B. Morrisonii, Cress., 1878.

♀ May 10, June 8, 9, September 15; ♀ July 20, 24; ♂ September 22, at Ft. Collins. 2 ♀ July 13, Trinidad; August 5, Antonito (Gillette). ♀ ♂ August 21, Cerro Summit; August 19, Horsetooth Gulch. ♂ August 22, Cimmaron. Taken on *Cleome serrulata*, *Mentzelia multiflora*, *Helianthus annuus*, *Thermopsis montanum*, *Alnus viridis* and "wild rose."

This very distinct species is one of the largest and finest Colorado Bombidæ; and is found not uncommonly in Colorado and New Mexico.

B. perplexus, Cress., 1863.

One ♂ September 22, Ft. Collins, which I doubtfully refer to this species. The pubescence is beautifully bright, and the black hairs are

very glossy. The second joint of the maxillary palpi is very long, the relation of first to second being as 2 to 19.

B. perplexus, var. *Hudsonicus*, Cress., 1863.

Prof. Cockerell records this variety from Cusack Rch, Custer Co., Colo., August 3. The type locality is "Hudson Bay Terr.," not "Hudson" as given by Dalla Torré.

B. Nevadensis, Cress., 1874.

B. improbus, Cress., 1878, ♂.

♀ ♀ June, July 12, 24, August 6, 18, at Ft. Collins; ♀ ♂ July 31, August 1, Beaver Creek; July 3, Little Beaver Creek; May 23, Boulder; May 26, Bellvue; August 5, Antonito (Ball); ♀ July 24, Virginia Dale; ♂ July 8, Livermore.

There is now little question that *B. improbus* is the male of this species. The type of the male was taken in "Colorado" by Morrison; of the female the types were from Nevada, Arizona and New Mexico.

B. fervidus, Fabr., 1798.

"Apathus elatus" ♂, in part.

♀ May 12, 30, June 7, 8, 11, 16, 19; ♀ May 14, 20, 25, June 15, July 20, 31, August 8, 19, 20; ♂ September 3, 16, all at Ft. Collins. ♀ ♀ August 14, July 8; ♀ July 15, at Livermore; ♀ August 5, Antonito; July 13, Trinidad; August 17, Montrose (Gillette); July, Ft. Lupton (R. Haynes). 2 ♂ September 4, Boulder. A very common species.

B. borealis, Kby., 1837.

This species was recorded by Prof. Cockerell from Old Beddoe's Rch, Custer Co., August 9, on *Rudbeckia laciniata*. I have not been able to satisfactorily separate this species from any material I have seen.

B. appositus, Cress., 1878.

♀ August, Ft. Collins (C. Stannard); August 5, Cameron Pass; August 9, Gunnison; August 23, Leadville; September 23, Vir. Dale; June 15, Bellvue; July 15, Livermore. ♀ ♀ August 30, Store Prairie (7,000 ft.). ♂ Palmer Lake, August 12, 1896 (Gillette). This species can readily be recognized by the white pubescence of the anterior part of the thorax; visible even in specimens on the wing. It has been taken on *Thermopsis montanum* and *Rudbeckia*, sp.

B. dubius, Cress., 1863.

This is recorded by Prof. Cockerell from Custer Co.; a female in the collection at Ft. Collins, doubtfully labelled *B. Edwardsii*, may belong here. I took the specimen at Westlake (8,000 ft.), July 7, 1900.

B. scutellaris, Cress., 1863.

♂ July 22, August 25, Ft. Collins; August 4, Julesburg (Ball). The pubescence is bright and showy, while on *B. Edwardsii*, its nearest relation, it is more irregular and paler.

B. Edwardsii, Cress., 1878.

♀ (2) June 12, Ft. Collins; June 15, Bellvue; Rist Canon, July 1; Westlake, July 7; August 3, Barnes' Camp (8,000 ft.).

B. Putnami, Cress., 1878.

♀ June 12, Ft. Collins; August 1, Lizard Head (Bali); ♂ August 30, Ward (7); August 17, Home (Ball). All these localities are high Alpine, 7,000 to 10,000 ft., Ft. Collins excepted. This species was described from one male collected by J. Duncan Putnam, probably at Empire City, a high Alpine species. Closely related to *Couperii* and *Edwardsii*. More abundant material is needed to base satisfactory determinations.

B. proximus, Cress., 1863.

♀ April 23, Horsetooth Gulch; July 21, Rist Canon; September 3, Vir. Dale. ♀ ☿ May 15, Ft. Collins; July 7, Westlake; August 18, Home (Ball); August 24, Vir. Dale; ♂ ♀ ☿ August 22, Cimmaron; August 23, Marshall Pass (Gillette).

B. proximus, var. *Coloradensis*, var. nov.

♀.—Black; face with yellow and black hairs; thorax banded with black; anteriorly yellow; scutellum with some black hairs mixed with yellow, especially along the sides; thorax beneath brownish-black; first two abdominal segments with black pubescence, third with fulvous yellow,—a few black hairs intermixed on basal margin; fourth to sixth with white hair, a high-power lens shows a few black hairs on the middle of fourth segment basally; a few pale hairs at extreme apical margin of second; posterior tibiæ and femora fringed with pale brown hairs, basal joint of posterior tarsi within very bright rufous, last four joints of all tarsi brownish; some pale hairs on fourth and fifth ventral segments; clypeus shiny, punctured; wings fuscous, tip of marginal cell very dark. Length, 20 mm.

Described from one specimen collected by me in Rist Canon (6,500 ft.), May 8, 1897. Easily separated from *proximus* or *Howardii* by the position and colour of abdominal pubescence.

B. Howardii, Cress., 1863.

☿ August 1, Beaver Ck. (10–12,000 ft.); August 23, Marshall

Pass, both by Prof. Gillette; and July 31, Ridgeway (Ball). ♂, Cimmaron, August 22 (Gillette).

The type specimen was taken at "Pike's Peak, Col. Terr.," by Mr. Winslow J. Howard. Prof. Cockerell records it from high altitudes in New Mexico. Mr. Ashmead writes me that he has never seen a queen of this species. It often is mixed with *B. proximus* in collections.

B. terricola, Kby., 1837.

This was determined for me by Mr. Ashmead; I had not recognized the species. ☿, Ft. Collins (C. Stannard).

B. Pennsylvanicus, De Geer, 1775.

B. americanorum, Fabr.

"Apathus elatus" in part.

I had the synonymy of this and the previous species mixed, but Mr. Ashmead kindly straightened out the matter for me, and gives me the above synonymy as correct, as far as *Pennsylvanicus* and *Americanorum* are concerned.

♀ June 9, 23, 29; ☿ July 23, August 8, 13; ♂ September 8, 17, 22; all at Ft. Collins.

♀ August 1, near Ft. Collins; June 30, near Foothills; July 8, Livermore; July 24, Vir. Dale; ☿ August 4, Julesburg (3 by Ball); August 7, 10, Rocky Ford.

B. Titusi, n. sp., Ashmead (in litt.).

♂.—Length, 16 mm. The abdomen dorsally covered with fulvous pubescence. One specimen September 10, 1898, Lamar (Gillette).

I had this specimen under *B. Pennsylvanicus;* Mr. Ashmead separated it out, and very kindly named it. The type is in the U. S. Nat. Mus.

B. ternarius, Say, 1838.

♀ May 3, 4, 12, 14, 19, 27, 28, April 16, 23; ☿ July 4, 20, August 6; ♂ August 5; all at Ft. Collins; ♀ May 16, Bellvue; ☿ July 8, 15, Livermore; July 31, Ridgeway; July 10, Lamar; July 27, September 3, Vir. Dale; July 20, Westlake; August 3, Durango; August 5, Antonito; ♂ Clear Ck. Can., July 18; July 7, Westlake; July 24, Vir. Dale; August 30, Ward; August 24, Glenwood Sprgs.; October 8, Salida.

This is the most common Colorado Bombus; it has been recorded heretofore from the State by Carpenter, "high Alpine," 1873; Dr. Uhler, Beaver Bk. Gulch, August 6; McCauley, "San Juan," 1877; J. D.

Putnam, from Empire, 1876; Prof. Cockerell, from Willow Ck., Custer Co., August 22; and by Dr. Rothrock, in 1872, from "Colorado"; and others.

B. rufocinctus, Cress., 1863.

♀ June 16, Ft. Collins; ♂ August 16, Horsetooth Gulch; both determined by Ashmead. Prof. Cockerell records this species from Custer Co., May 28, and August 19.

B. bifarius, Cress., 1878.

♀ May 28; ♂ August 26 (Bruner), at Ft. Collins; ♀ May 23, Boulder; ♀ ☿ July 7, Westlake; July 1, Rist Canon; ☿ August 23, Marshall Pass (Gillette); August 25, Alder; July 10, Lamar; ☿ ♂ August 22, Cimmaron; August 30, Ward; August 2, Muldoon (Ball); ♂ July 23, Palmer Lake; July 31, Ridgeway; August 14, Steamboat Springs.

B. *sylvicola*, Kirby, 1837.

♀ August 1, Lizard Head (Ball); ☿ August 25, Alder (Gillette); August 2, Muldoon; ♂ ☿ August 27, Marshall Pass; ^{3}♀ ^{1}☿ ^{10}♂ August 30, Ward (Ball). All determined by Ashmead. Prof. Cockerell records it from Ula, Custer Co., July 30. It is certainly a distinct high Alpine species, and I had not recognized it.

B. juxtus, Cress., 1878.

♀ July 8, Livermore; ☿ July 20, Ft. Collins; July 23, Vir. Dale; August 2, Estes Park (Gillette); August 20, North Park (Ball); ♂ August 22, Palmer Lake.

I have seen a male from Woods Holl, Mass. (Gillette), that belongs to this species.

B. flavifrons, Cress., 1863.

♀ ☿ August 27, Marshall Pass; ♀ ☿ ♂, August 1, Lizard Head (Ball); August 30, Ward.

This species in general appearance sometimes resembles *B. juxtus*, but can be readily separated. Some specimens from Lizard Head are very bright, and the thorax has much more black anteriorly than in ordinary specimens.

B. Couperi, Cress., 1878.

♀ ♂ August 30, Ward; August 1, Lizard Head, all determined by Ashmead. Prof. Cockerell has stated that he did not feel warranted in separating *Couperi* and *Putnami* from *frigidus* after examining the types

of the two former. *Putnami*, as recognized in this paper and as determined for me by Mr. Fox and Mr. Ashmead, can be readily separated from *Couperi*.

B. Oregonensis, Cress., 1878.

♂ August 30, Ward; August 1, Lizard Head, several specimens collected by E. D. Ball and determined for me by Mr. Ashmead.

B. mixtus, Cress., 1878.

♀ Ft. Collins, May 22; ♀ August 5, 19, Cameron Pass; August 17, Home; August 30, Ward. I have seen no males, and what I take to be queens are rather small and some of them may prove to be workers.

B. sonorus, Say.

This has been taken in New Mexico by Prof. Cockerell, and is added to the Colorado list on authority of Mr. Ashmead. It is very closely allied to *B. fervidus*. Specimens I have seen can be readily separated. There is black pubescence on the sides of the thorax.

Mr. Ashmead, in his List of Colorado, Hymenoptera, recorded twenty-eight species of Bombus. I have included in the table the following, of which I have seen no specimen from this State: *Bombus affinis*, *B. hudsonicus*, *B. vagans* and *B. virginicus*. In this paper twenty of these species are given Colorado records.

The records from Prof. Cockerell referred to several times, are from his Custer County list.

I wish here to express my thanks for favours received from Prof. T. D. A. Cockerell, Mr. W. J. Fox and Prof. L. Bruner, and especially for the kind assistance of Mr. W. H. Ashmead. Prof. C. P. Gillette, under whom these studies were carried on, has ever been ready and willing to aid me in any possible way.

ANÆA ANDRIA IN INDIANA.

On April 27th, while collecting with my young son, Robert, the boy distinguished himself by capturing several ♂ ♂ of *Anæa andria*, at a point east of Richmond, Ind., not far from the Indiana-Ohio State line. The authorities give the habitat of *andria* as "Western States, from Illinois to Texas; Nebraska." No ♀ ♀ were seen, nor were any specimens seen in the fall. I presume that south-western Ohio can be considered its most eastern habitat. No apparent difference exists between the specimens referred to and material from Texas and other western points.

W. N. Tallant, Richmond, Ind.

NEW BEES OF THE GENUS ANDRENA, FROM WISCONSIN.

BY T. D. A. COCKERELL, E. LAS VEGAS, N. M.

Andrena subcommoda, n. sp.

♀.—Length about 12 mm.; black; head and thorax with pale ochraceous or whitish hair, very short and thin on thoracic dorsum; head ordinary, facial quadrangle square; vertex behind the ocelli finely roughened and punctured; front below the ocelli punctured as well as grooved; facial foveæ broad, pale, closely adjacent to eyes; antennæ dark; clypeus thinly hirsute, shining, strongly but not densely punctured, no median smooth line; process of labrum truncate; maxillary palpi short; mesothorax shining, strongly but not densely punctured; metathorax very coarsely roughened, enclosure irregularly subreticulately ridged, but without a transverse bounding ridge; tegulæ dark, with a ferruginous spot; wings dusky with a yellow tint, nervures and stigma ferruginous, second submarginal cell broad; legs wholly dark; hind tibial spur of hind legs much curved; hair on inner side of basal joint of hind tarsi fulvous; abdomen shining, strongly and closely punctured, finely pubescent at sides, but without dorsal hair-bands; fimbria fulvous.

Hab.—Milwaukee, Wisconsin, June 11. *(Dr. S. Graenicher.)* Differs from *A. Commoda* by not having ferruginous tarsi and hind tibiæ; also by the truncate process of labrum. By the latter character, among others, it differs from *A. pruni*.

Andrena Sigmundi, n. sp.

♀.—Length 10 mm.; black; pubescence brownish-white; head ordinary; cheeks densely and strongly punctured; antennæ dark; first joint of flagellum rather short; front below ocelli cribrately punctured; clypeus bare, very shiny, very densely and strongly punctured, with a narrow median impunctate line on the lower two-thirds; facial foveæ pale, narrow below, broadening gradually above; process of labrum truncate; mesothorax very strongly and densely punctured; scutellum the same; metathorax cribrate, very rough, enclosure with small vermiform plications and no transverse ridge; tegulæ piceous, with a brown spot; wings stained with yellowish; nervures and stigma dark ferruginous; first recurrent nervure entering second submarginal cell at the beginning of its last third; legs wholly dark; hair on inner side of basal joint of hind tarsi fuscous, shining coppery; abdomen suboval, shining, strongly and rather closely punctured; no hair-bands, but segments 4 and 5 fringed with shining hairs; fimbria auro-fuscous.

Hab.—Milwaukee, Wisconsin, May 26. *(Dr. S. Graenicher.)* This is very similar to *A. Forbesii*, but that species has a transverse ridge on the metathorax, and the punctures of the abdomen (especially the second segment) closer. Still, they are very closely allied.

Andrena multiplicata, n. sp.

♀.—Length about 9 mm.; black; head and thorax with stiff yellowish-white pubescence; head ordinary, facial quadrangle square; vertex with very large punctures; front below ocelli cribrately punctured; facial foveæ whitish, broad, closely adjacent to eyes; antennæ dark; clypeus polished, strongly and closely punctured, with a hardly defined median smooth line; process of labrum rounded; mesothorax and scutellum somewhat shining, with fairly close, large and deep punctures, those on scutellum very large and irregular; base of metathorax very strongly longitudinally plicate, with a strong transverse ridge, the plicæ are about eight on each side of the middle line; tegulæ piceous, with a pale margin and a fulvous spot; wings dusky, with a yellowish tint, nervures and stigma dark ferruginous; legs very dark brown, hind tarsi very dark ferruginous; basal joint of middle tarsi rather broad; hair on inner side of basal joint of hind tarsi light orange-fulvous; abdomen strongly and closely punctured, punctures on basal part of second segment much smaller and closer than those on basal part of first; segments 1 to 4 with lateral white hair-bands, those on 3 and 4 much narrowed medially, but nearly continuous; fimbria fulvous.

Hab.—Milwaukee, Wisconsin, June 2. *(Dr. S. Graenicher.)* Belongs to the group of *A. rugosa*, and is allied to *A. Forbesii* and *A. grandior*.

Andrena radiatula, n. sp.

♀.—Length about 10 mm.; black; pubescence rather dense, reddish-brown dorsally, paler elsewhere; abdomen not banded; fimbria pale purplish-gray. This is closely similar to *A. Sigmundi*, but differs as follows: Head smaller, facial quadrangle narrower; facial foveæ with a reddish tint, and narrowing more rapidly below; clypeus hairy all over; hair of thorax strongly reddish; basal area of metathorax more regularly plicate and better defined; third submarginal cell less narrowed above.

Hab.—Milwaukee, Wisconsin, June 16. *(Dr. S. Graenicher.)*

Andrena rufosignata, n. sp.

♀.—Length about 10 mm.; black; pubescence whitish, tinged with

yellow above, especially on the scutellum; head ordinary, facial quadrangle about square; antennæ rather long, flagellum dark ferruginous beneath towards end; cheeks tessellate and hardly or not punctured; front below ocelli striate; clypeus granular and dull at the sides, but disc strongly shining, with strong sparse punctures, the lower middle almost wholly impunctate; process of labrum rounded, broad, the end very slightly truncate; mesothorax minutely tessellate, dull, with shallow, hardly visible, punctures, median and parapsidal grooves distinct; scutellum slightly shining but not polished; base of metathorax granular, no transverse ridge; tegulæ piceous in front, dark reddish-brown posteriorly; wings nearly clear, apical margin slightly dusky; stigma clear ferruginous, nervures darker; legs dark, hair on inner side of basal joints of middle and hind tarsi fulvous; abdomen broad, tessellate-impunctate, without hair-bands; fimbria fulvous.

Hab.—Milwaukee, Wisconsin, May 19. *(Dr. S. Graenicher.)* When one looks at the head from above, the broad facial foveæ are seen to have a strong red tint, which is very distinctive of the species.

Andrena clypeonitens, n. sp.

♀.—Length about 9½ mm.; black; pubescence pale ochreous, brighter on scutellum; head broad, facial quadrangle somewhat broader than long; antennæ dark, flagellum very faintly reddish towards tip; front below ocelli striate; disc of clypeus bare, sparsely punctured, with a large shining impunctate space; process of labrum broad and rounded; facial foveæ pallid, rather broad, adjacent to eyes; mesothorax dull, minutely tessellate, impunctate; basal area of metathorax dull, defined only by absence of hair; tegulæ very dark brown; wings smoky, nervures dark brown, stigma dark ferruginous, with a dark brown margin; second submarginal cell nearly square; legs black, the three first small joints of tarsi deep ferruginous; hair on inner side of basal joint of hind tarsi fuscous, shining coppery; abdomen tessellate-impunctate, with continuous white hair-bands, that on the first segment reduced to a few scattered hairs, those on the others dense and conspicuous; fimbria and hair of penultimate segment dark purplish-gray.

Hab.—Milwaukee, Wisconsin, Aug. 19. *(Dr. S. Graenicher.)* A species of the group of *A. solidaginis* and *A. xanthigera*. The clypeus will at once separate it from *A. solidaginis*, which occurs in the same region.

SOME NEW OR LITTLE-KNOWN BEES—II.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

In my neighbourhood I find the typical *Andrena Cressonii*, Rob., and the form described below as *A. dubia*, the latter more rare. To compare this with the form described as *A. Bridwellii*, Ckll., I have obtained from Mr. Bridwell for examination thirty-three specimens taken by him at Baldwin, Kansas, and labelled *A. Cressonii*, *A. Kansensis*, and *A. Bridwellii*.

A. Kansensis is the same as *A. Cressonii*, the colour of the pubescence being characteristic of unfaded specimens. Local specimens sometimes have the hind tibiæ and tarsi ferruginous in both sexes.

A. Bridwellii seems to be the common form at Baldwin. It differs from the typical *A. Cressonii* in the characters mentioned below. Some specimens have the flagellum testaceous beneath and some have the tarsi and hind tibiæ more or less ferruginous. It is intermediate between *A. Cressonii* and *A. dubia*. If I should find *A. Bridwellii* in my neighbourhood, I would regard them all as *A. Cressonii*. As it is, they may be only variant forms of *A. Cressonii*, but I have thought it well to separate *A. dubia* provisionally and to let *A. Bridwellii* stand on the same basis. The validity of both depends on the discovery of characters which will enable one to separate the females from each other and from females of *A. Cressonii*.

Joint 3 of antennæ shorter than 13, about as long as 5, entire apical margin of clypeus black, lateral face marks small or wanting.... .....*A. dubia*, sp. nov.

Joint 3 of antennæ as long as 13, and as long as 4 and 5 together.

1.—Middle of anterior margin of clypeus black, lateral face marks large.....*A. Cressonii.*

Entire apical margin of clypeus black, lateral face marks small or wanting..... .....*A. Bridwellii.*

Dialictus, gen. nov.

This is proposed as a new genus for the reception of *Halictus anomalus*, Rob., as the type. The species was described from two specimens, and I suspected that I might find examples with three cubital cells and that the males might not differ from the ordinary dull greenish *Halictus*, except in the venation. But the male differs from all of those species of *Halictus* known to me in having the antennæ short, the joints hardly longer than wide, joint 3 hardly longer than

2. The flagellum is usually dark, but sometimes it is testaceous beneath. I have 3 ♀ and 5 ♂ specimens.

Nomada denticulata, sp. nov.

Nomada articulata, Rob., Tr. Am. Ent. Soc., xxii.: 124, ♂, 1895 (nec Sm.).

Nomada articulata, Rob., Tr. Acad. Sci., St. Louis, viii.: 51, ♀, 1898.

Synhalonia Illinoensis, sp., nov.—♂. Differs from *S. atriventris* ♂ in joint 3 of antennæ being one-half as long as 4. The form *fuscipes* of *S. atriventris*, Tr. Acad. Sci., St. Louis, x.: 54, may be a distinct species, and this may be the male of it.

Agapostemon pulcher, Sm.—When writing the account of the local species of *Agapostemon*, in Tr. Acad. Sci., St. L., vii.: 325–30, I found no males of *A. radiatus* farther west than Nebraska, though I have since seen them from Colorado. A form resembling *A. radiatus* ♀ was identified as *A. pulcher*, Sm. *A. femoratus*, Crawford, Nebr. Acad. Sci., vii.: 162, was identified as the male.

Megachile petulans, Cresson (Trans. Am. Ent. Soc., vii.: 127, ♂, 1878). ♀.—Quite short and robust, the edge of the vertex passing before a line drawn between the posterior margins of the eyes, one of the posterior ocelli, therefore, nearer the vertex than to the neighbouring eye.

This was identified for me by Mr. Cresson as *M. optiva* ♀, and I have indicated *M. petulans* as the male of that species, in Trans. Acad. Sci., St. Louis, vii.: 350, 1897. Lately, through the kindness of Dr. Skinner, I have had an opportunity to examine the two type specimens of *M. optiva*. They belong to two species, and neither of them is the female of *M. petulans*. One of them is, I think, the female of *M. facunda*. The two species and *M. sexdentata*, Rob., may be separated as follows:

Middle metatarsus narrower than its tibia, apical ventral segment of abdomen not reflexed, anterior margin of clypeus entire . . *M. optiva*, pt.

Middle metatarsus as broad as its tibia, apical ventral segment of abdomen reflexed . . . . . 1.

1.—Apical margin of clypeus with a median and two lateral teeth, *i. e.*, 5-toothed . . . . . *M. optiva*, pt.

Apical margin of clypeus smooth and shining, with a median dentiform carina . . . . . *M. sexdentata*.

In the preceding paper, CAN. ENT., XXXIII., 229, sixth line from the bottom, "anal rims" should read "anal rima"; and on page 230, "*obliqua*," repeated thrice in italics, should read "*desponsa*."

ADDITIONAL NOTES ON THE LIFE-HISTORY OF *ARCTIA PHALERATA*, HARR.

BY ARTHUR GIBSON, DIVISION OF ENTOMOLOGY, CENTRAL EXPERIMENTAL FARM, OTTAWA.

In the December number, 1900, of this journal, page 369, the writer published the life-history of the above Arctian. During the past summer, through the kindness of Mr. A. Kwiat, of Chicago, in forwarding eggs of *A. phalerata* (laid 18th June), I have had the opportunity of still further studying this species, and, as these larvæ varied considerably from those described in 1900, the following notes were made:

In the larval stages i, ii and iii those bred in 1901 answered well to my former descriptions. In stage iv the larvæ were not so black as the specimens reared the previous year, but many of them showed the dorsal stripe. This stripe was also present in stage v, besides which 40 of the larvæ possessed a series of pale orange spots on sides between tubercles ii and iii, and iii and iv, and the skin of the body in a line with the upper spots (between tubercles ii and iii) was slightly grayish, not black like the rest of the skin; this and the spots gave the appearance of a faint lateral band, distinguishable on all segments but 2 and 13. In stage v in 1900 none of the larvæ showed the dorsal stripe. In stage vi last season all of the 123 specimens, with the exception of 2, showed a distinct orange dorsal stripe, but in a few specimens this was faint. In 1900 the specimens did not show a dorsal stripe in this stage. In stage vii the larvæ were much larger the past season than those bred the previous year. The mature larvæ in July, 1900, measured 30 mm. at rest; those in July, 1901, averaged 42 mm. in length, and all the specimens but 9 showed the distinct dorsal stripe, expanded in the middle of each segment, or the series of elongated spots noted in my previous description of this stage. In many of the larvæ the stripe was present on all the segments, but was particularly wide and distinct on segments 5 to 13, inclusive.

In stage vi in 1900 the width of the head averaged from 2.0 to 2.4 mm. The past year some of the heads were 2.6 mm. wide. In stage vii also in 1900 the width of the head, as given in my description, was 2.5 to 2.8 mm. In July, 1901, the widest head measured 3.4 mm. The chief variation in the mature larvæ bred the past season was in the colour of the bristles. In many specimens the bristles from all the tubercles, with the exception of a few short bristles from the tubercles above the spiracles, were of a decidedly pale grayish colour, tipped with black; in

others the bristles were more of a yellowish tinge, those from tubercles on segments 2, 3 and 4 being slightly rusty. In these specimens the skin of the body was not so black, and did not have the velvety appearance which the larvæ with the black bristles from dorsal tubercles had. In some larvæ all the bristles, with the exception of a few black ones from tubercles above spiracles, were a pale rust-red, those from tubercles on segments 2, 3 and 4 being brighter. In most cases the bristles from tubercles above spiracles of larvæ bred in 1900 were black, the only exception being that in some specimens all the dorsal tubercles bore a very few bristles of a dark rusty colour; none, however, possessed any pale grayish or yellowish bristles as above mentioned.

On the 14th July, 1901, some of the specimens had changed to pupæ, and on the 23rd July the first moths emerged. Early in August 2 males and 2 females, which had just emerged, were placed in a cage out of doors, and another batch of eggs were secured. These hatched in due course, and about 32 of the larvæ passed through all their stages by the 1st September, and by the 14th and 15th the first moths of this brood appeared, the date of the last emergence being 14th October. The larvæ which did not pupate, having showed signs of hibernation, were placed in a cool cellar on the 21st October, to be afterwards put outside for the winter.

In 1900 there was a remarkable lack of variation in the moths bred, but this cannot be said of those reared the past year. While the majority, however, did not show any material variation, yet in some specimens the W mark on the primaries was indistinct, and in a few moths (females), nearly obsolete. In fact, there was much variation as to the width of all the bands on the primaries. In some specimens these were quite wide, in others the bands were narrow. Then, again, the colour of the secondaries in four of the females reared was quite yellow, almost as yellow as the secondaries of the males. In the moths of the two broods bred the past season, the black edging of the primaries in both sexes was more in evidence than those reared in 1900.

South Kensington Museum loses a distinguished lepidopterist in Dr. A. G. Butler, the head of the entomological section, who retires under the age limit after nearly forty years' connection with the zoological department. Dr. Butler is a great authority on African butterflies, and he has also won world-wide reputation as an enthusiastic ornithologist. It is stated that his successor will be Sir George Hampson.—*London, Eng., Daily Telegraph.*

THE ACADEMY OF SCIENCE OF ST. LOUIS.

At the meeting of the Academy of Science of St. Louis, on the evening of January 6, 1902, Mrs. Wm. Bouton, on behalf of herself and a considerable number of other persons, presented to the Academy a collection of 633 butterflies mounted on Denton tablets, on condition that the collection should be made accessible to the public.—WILLIAM TRELEASE, Recording Secretary.

A CORRECTION.

Before venturing to send my Synonymic Notes for publication, I made a careful search of the entomological literature accessible to me, but a few days after I had returned the corrected proof, I found in a work which I had just added to my library the name *Euchætes*, Lec., cited as a synonym of *Eunyssobia*, Casey.

I immediately telegraphed to the editor to suppress the name *Epeuchætes* which I had proposed, and that I would pay the expense of resetting and reprinting the pages involved. I was too late, unfortunately, as the number was complete and ready for mailing, and as its issue had already been retarded by other causes, the editor did not deem it expedient to further delay it.

Since the appearance of my notes I have been favoured with a letter from Mr. Samuel Henshaw, informing me that the name *Euchætias* proposed by me is unnecessary, and that Harris's name, *Euchætes*, is tenable on account of Dejean's *Euchætes* being a "nomen nudum," a mere list name, and that the date of Dejean's work was 1833, not 1834.

Dejean's work was not accessible to me, but I thought I was safe in depending upon Dr. Scudder's "Nomenclator Zoologicus," in which the first use of the term is credited to Dejean in 1834, and I supposed that the first use of a term given would be valid. I am by no means sure that the invalidity of mere catalogue names has always and universally been recognized, though I quite agree that they should not be accepted. I may say that the entomological editors of the Century Dictionary followed Dr. Scudder's work in regard to this name.

It is with the keenest regret that I find myself in what Dr. Skinner has delicately referred to as the "synonymic consommé."

Montreal, 23rd Jan., 1902. H. H. LYMAN.

Mailed February 4th, 1902.

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THE GENUS COCHLORHINUS, UHLER, AND ITS ALLIES (JASSIDÆ).

BY E. D. BALL, FORT COLLINS, COLO.

Some time ago Dr. Uhler was kind enough to lend me the types of *C. pluto* for study in connection with some allied material from the National Museum. This new material, while generically distinct, is so closely allied to *Cochlorhinus* in many ways, and at the same time possessing more nearly the typical Acocephaline characters, that it is now possible to assign this unique genus to an approximately correct position in the group, and give its characters from a comparative standpoint.

It is apparently a rare form, as the three original females taken more than twenty-five years ago are the only known specimens of the species. To make this nondescript form more accessible to the workers in the group, and as a basis for the comparisons in the descriptions that follow, it has been thought best to give a comparative description of the genus and species, and also a figure of the type, together with its more important details.

Genus COCHLORHINUS, Uhler.

Uhler, Bull. U. S. Geol. and Geog. Surv. II., p. 358, 1876. Van Duzee Cat., p. 289.

Related to *Acocephalus*, but quite distinct; vertex slightly longer than broad, acutely angled, disc flat, with the margins slightly elevated, ocelli on the margin almost one-third the distance to the apex. Face retreating, acutely angled with vertex, concave in profile. Front narrow, convex, a distinct ridge extending to the apex, either side of which the margin is depressed and slightly foliaceous. Pronotum transverse, coarsely transversely rugulose, the margins nearly parallel, the anterior slightly more curved. Elytra coriaceous, the nervures raised, apical margin broadly rounding, with a narrow appendix; venation definite, two cross nervures

between the sectors, three anteapical cells, the outer one usually stylated at its apex; five apical cells, the first triangular, the three following broadly wedge-shaped, and the fifth similar to the anteapical cells; their bases and the base of the fifth apical, which is usually either a forked or double nervure, broadly embossed with white obscuring the actual course of the nervures.

The flat vertex with its slight margin, the coriaceous elytra with the raised nervures, and the ocelli distant from the eyes, will place this in the *Acocephalinæ;* at the same time the whole vertex and front strongly suggest the genus *Platymetopius*, and the pattern of venation approaches that found in some species of that genus. Whether this indicates relationship or similar lines of development can be more easily answered when the habits and life-history have been studied, and other of its relatives have been found.

Cochlorhinus pluto, Uhler. Plate 2, fig. 1.—Elongate, subparallel; vertex acutely angled, the apex produced. Black, with an irregular band on the elytra behind the middle, and a triangle across the face, white. Length, 6 mm.; width, almost 2 mm.

Genus UHLERIELLA, n. gen.

Resembling *Acocephalus* in form and general appearance, but with the ocelli on the sharp vertex margin, and the venation quite distinct and resembling that of *Cochlorhinus*. Vertex slightly, obtusely angled, nearly half wider than long in the female, still shorter in the male, not quite as long as the pronotum, disc sloping, the margin flat or slightly upturned; ocelli on the margin not quite twice as far from the apex as from the eyes. Face slightly, evenly rounding, front wedge-shaped, the margins nearly straight; in profile straight or slightly convex, never concave nor with a median ridge. Clypeus parallel margined, a trifle rounding at apex. Pronotum as in *Cochlorhinus*; lateral margins rounding almost from eyes, posterior margin emarginate. Elytra rather broad, varying from coriaceous to subhyaline, slightly obliquely truncate posteriorly, with the angles rounded; venation resembling that of *Cochlorhinus*, the outer anteapical usually stylated and with two slightly divergent nervures from the apex to the costa, these nervures, and often forkings of the sectors, obscured by the white embossing.

Type *U. Coquilletti*, Van Duzee.

In the general plan of venation and the white embossing, the shape of the pronotum and the transverse light band on the face this genus

approaches closely to *Cochlorhinus*, but in the shape of the vertex and front, which are the dominant characters in this group, it is widely divergent, and approaches most closely to *Acocephalus*, from which, however, the position of ocelli and venation renders it quite distinct.

KEY TO THE SPECIES.

A Elytra short and stout, a transverse white band across the bases of the anteapical cells reaching the costa, outer anteapical stylate, its outer nervure straight or slightly rounding before the juncture. Face half or more than half black.

B Vertex and pronotum with alternate bands of black and light. Elytra with the nervures and transverse bands light. Male plates individually rounding at apex... *Coquilletti*, V.D.

BB Black except for the transverse band on the elytra and dot at apex. Male plates acute at apex..... *stygica*, n. sp.

AA Elytra longer and narrower, without transverse white marking, and lacking the second cross nervure; outer anteapical cell angled out nearly to the costa. Face more than half light..... *signata*, n. sp.

Uhleriella Coquilletti, Van Duzee. Plate 2, fig. 2.—Deltocephalus Coquilletti, Van Duzee, Ent. Americ., VI., p. 95, 1890.—Cat. p. 293. Form of *stygica* nearly, but broader and with more flaring elytra; vertex and pronotum of same form and colour pattern as in *signata*, elytra broad, clavus black with the nervures broadly light, corium brown, the nervures narrowly light, an oblique band across the first cross nervure, a transverse band across the second, a band across the base of the apical cells forked at each end, and the narrow apical margin, milk white.

This species is somewhat intermediate in form between the two following and by itself might not be recognized as being related to *Cochlorhinus*, but when compared with *stygica* this relation is at once evident.

Uhleriella stygica, n. sp. Plate 2, fig. 3.—Form of *Coquilletti* nearly, slightly smaller and with a longer and more rounding vertex. Shining black, a transverse band on elytra and another on face, white. Length, ♀ 4.5 mm., ♂ 4 mm.; width, 1.5 mm.

Vertex slightly sloping, transversely depressed, the margin sharp, half wider than long in female, almost twice as wide in the male, slightly obtusely angled, with the apex rounded off. Pronotum distinctly transversely rugose; elytra coriaceous, but little longer than body, compressed at tip; venation resembling that of *C. pluto*.

Colour: black above, a raised transverse band extending from the costa across the bases of the anteapical cells and running out a little on each nervure, milky white; the tip of the fourth apical nervure is also white. Below black, a broad crescentiform band across the face, the tibiæ and tips of all the femora, yellowish white.

Genitalia: female segment nearly twice as long as the penultimate, posterior margin rounding, with a slight median emargination. Male valve roundingly triangular, about as long as the ultimate segment; plates broad, roundingly triangular with the apices acute, nearly three times the length of the valve.

Described from eight specimens received from the National Museum; from Kern Co., Calif. Coquillett collector.

Uhleriella signata, n. sp. Plate 2, fig. 4.—Closely resembling *Coquilletti*, larger and with longer elytra, pattern of marking similar, but without the two white bands on elytra. Length, 5–5.5 mm.; width, 1.75 mm.

Vertex slightly sloping, flat or slightly transversely depressed, not quite twice wider than long, a little over half as long against eye as on middle; face as in *Coquilletti*, front narrow, wedge-shaped. Pronotum more strongly convex in front than in *Coquilletti*, emarginate posteriorly with the outer angles rounded. Elytra long and rather narrow, subhyaline towards the margins, the apex roundingly truncate. Venation resembling *Coquilletti* in general pattern, but with the outer anteapical cell angled out nearly to the costa and lacking the white bands on the cross nervures, two apical nervures arise from the exposed outer face of the central anteapical cell and run nearly parallel to the costa, forming a long narrow cell; the second cross nervure wanting.

Colour: vertex pale yellow, a transverse band just before the middle, parallel with the posterior margin, testaceous brown. Pronotum with four transverse bands parallel with the anterior margin, the anterior one testaceous brown, the next pale creamy or slightly greenish yellow, the third, which does not reach the lateral margins, light testaceous, posterior margin greenish white. Scutellum pale yellow, with large triangular black spots in the basal angles and a pair of interrupted stripes across the disc. Elytra brown, darkest on the clavus, shading out to subhyaline along the margin, the sutural margin and claval sutures narrowly light, nervures, except the apical ones, broadly so; apical margin narrowly milk white, bordered inside by a wider smoky band, the bases of the

apical cells hyaline white in sharp contrast. Face pale yellow, a black band across between the eyes, narrowed on the front and emitting a line under the vertex margin, clypeus and lower third of loræ, black.

Genitalia: female segment long and narrow, over twice the length of the penultimate, narrowing posteriorly and terminating in two rounding lobes separated by a broad notch; male valve obtusely triangular, as long as the ultimate segment, plates broader than the valve, long triangular, over four times as long as the valve, their margins clothed with long silky hairs.

Described from eleven specimens from the National Museum; from Los Angeles Co., Calif. Coquillett collector.

In shape and colour marking of vertex and pronotum this species and *Coquilletti* are almost identical, but the venation of the elytra as well as its colour pattern is quite different, and the genitalia are distinctive. Those who consider the presence or absence of the second cross nervure a good generic character would place these two species in different genera.

Genus HULERIA, n. gen.

Form long and narrow, almost parallel margined, vertex longer and more angulate than in *Parabolocratus*, as long as its basal width, one-third longer than the pronotum in the female, two and one-half times as long on middle as against eye, disc flat, the margins inclined to be elevated; ocelli on the margin about one-fourth the distance from eye to apex. Face in profile perfectly flat, retreating as strongly as in *Hecalus*, transversely convex; the front broad above, the margins straight from the ocelli to the rather small, parallel margined, clypeus. The upper part of the front has a quite definite median ridge, which becomes narrower and more elevated as it approaches the apex of vertex, leaving a narrow compressed margin to the vertex. Pronotum twice wider than long, the anterior and posterior margins nearly parallel, lateral margins straight; elytra very long and narrow, evenly rounding at the apex, with a very narrow appendix; venation as in *Thamnotettix*, the anteapical cells very long, extending more than half their length beyond the apex of clavus, apical cells very short and regular.

Type of the genus *H. 4-punctata.*

The elevated ridge on front and general shape of face and vertex are very similar to *Cochlorhinus*, but the venation and general shape of the elytra are quite different.

Huleria 4-punctata, n. sp. Plate 2, fig. 5.—Pale dirty yellow; four spots across the vertex in front of the eyes; two irregular stripes on pronotum, and a stripe under the edge of the vertex, black. Length, 7 mm.; width, 1.5 mm.

Vertex acutely angled, with the apex bluntly rounding, slightly upturned; eyes small, slightly wider than pronotum. Pronotum transverse, roundingly or slightly angularly emarginate posteriorly. Elytra with the nervures distinct, two claval nervures, long, straight and parallel with the suture; but one cross nervure between the sectors, the inner anteapical cell much longer than outer, often an extra apical nervure arising from the apex of the outer anteapical, forming a small subquadrate cell.

Colour: vertex pale yellow, a pair of angular black spots on the margin between the ocelli and eyes, another pair on the disc slightly in advance of these; eyes reddish brown. Pronotum dirty straw, a wavy black stripe running back from the inner corner of each eye, but not reaching the posterior margin; elytra dirty straw, slightly tinged with brown, the nervures and margins pale and quite distinct. Face and below pale creamy yellow, a parallel margined black stripe half its own width below the margin of the vertex, and extending back under the eye.

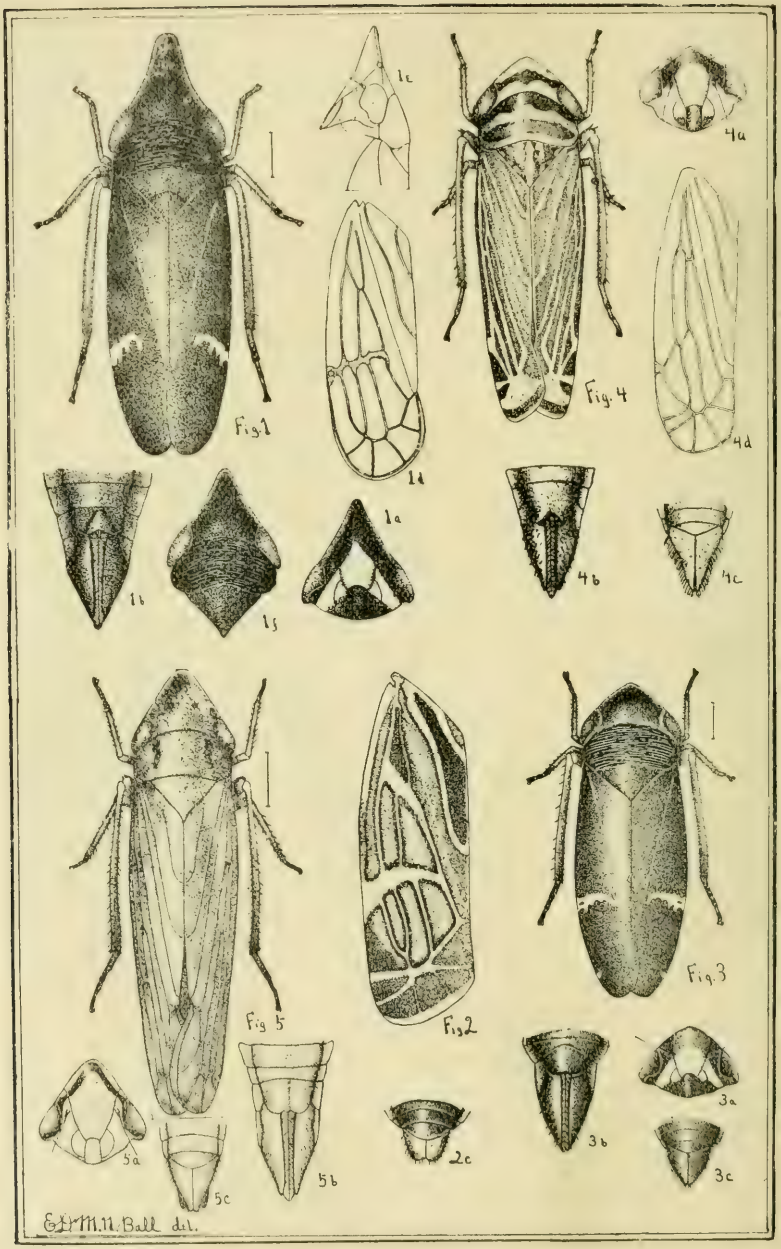
Genitalia: female segment nearly half longer than penultimate, narrowing posteriorly; posterior margin slightly rounding, with an abrupt subquadrate notch; a short strap-shaped tooth almost fills this notch (a quite marked median carina in this specimen); male valve as broad as the ultimate segment and a little longer, posterior margin evenly rounding, plates nearly as wide as the valve and three times as long, roundingly narrowing two thirds of the distance, and then produced as two finger-like tips, margined with short weak hairs.

Described from one female and two males from the National Museum collection, labelled "Los Angeles Co., Calif. Coquillett collector."

Explanation of Plate 2.

Fig. 1.—*Cochlorhinus pluto*, Uhler. Female from type.
a, face; *b*, ♀ genitalia; *c*, ♂ genitalia; *d*, elytron, showing venation and embossing; *e*, profile of face; *f*, head and pronotum of co-type.

Fig. 2.—Elytron of *Uhleriella Coquillettí*, Van Duzee, showing venation and pattern of marking. *c*, ♂ genitalia.



JASSIDÆ—THE GENUS COCHLORHINUS AND ITS ALLIES.

Fig. 3.—*Uhleriella stygica*, n. sp. Female.
a, face; *b*, ♀ genitalia; *c*, ♂ genitalia.

Fig. 4.—*Uhleriella signata*, n. sp. Female.
a, face; *b*, ♀ genitalia; *c*, ♂ genitalia; *d*, elytron, showing venation.

Fig. 5.—*Huleria 4-punctata*, n. sp. Female.
a, face; *b*, ♀ genitalia; *c*, ♂ genitalia.

FURTHER NOTES ON MASSACHUSETTS COCCIDÆ.

BY GEORGE B. KING, LAWRENCE, MASS.

Since the publication of my last contribution on the Massachusetts *Coccidæ*, in 1899, no less than 34 other species have been found to inhabit Mass., some of which appear to be of recent introduction and new to the United States; and while the larger portion has been recorded from other States, we have found several interesting new species hitherto not known to science. I have abandoned in part the citation of the geographical distribution and many of their food-plants, as time will not permit me to consult some of the literature. I have included an additional check-list and the Bibliography. In the original check-list several species are listed whose names have since been changed as follows. Those in heavy type are the old names, while those now considered correct are in *italics*:

Dactylopius adonidum, L.	*D. longispinus*, Targ.
Lichtensia viburni, Sign. var.	*Pulvinaria Cockerelli*, King.
Aspidiotus ficus, Ashm.	*Chrysomphalus aonidum*, L.
Parlatoria Pergandii, Comst.	*P. proteus*, var. *Pergandii*.
Mytilaspis pomorum, Bouché.	*Mytilaspis ulmi*, L.
" citricola, Pack.	" *Beckii*, Newm.
Gossyparia ulmi, Geoff.	*G. spuria*, Modeer.
Asterolecanium quercicola, Sign.	*A. variolosum*, Ratz.
Lecanium hemisphæricum, Targ.	*Saissetia hemisphærica*, Targ.
" filicum, Boisd.	" *filicum*, Boisd.

The following are additions to the Mass. list:

Dactylopius nipæ, Mask. Found for the first time in the U. S., in the Harvard botanical greenhouse at Cambridge, Mass. *Introduced.*

Kermes Pettiti, Ehrh., 1899. A very common species on oak throughout the State, and seems to have been taken and mixed with *K. galliformis* for a long time. *Native.*

Kermes Andrei, King, 1900. Described from Lawrence, Mass., on oak; has been found in Georgia; it is a pretty and clearly a distinct species. *Native.*

Kermes Perryi, King, 1900. As yet only known from Mass. on oak. *Native.*

Lecanium lauri, Boisd., 1735. Found on *Laurus nobilis*, Springfield, Mass., by Dr. G. Dimmock. The small tree was so badly infested that it died. It has been found in France and New Zealand. *Introduced.*

Eulecanium cerasifex, Fitch, 1856. On wild and cultivated cherry trees at Andover and Lawrence, Mass., but not in sufficient numbers to cause any alarm. *Native.*

Eulecanium quercitronis, Fitch, 1856. This is found on *Ulmus Americana* at Methuen, Mass., on *Xanthoxylum Americanum* at Cambridge, Mass., and on *Ulmus Americana* in company with *Chionaspis Americana*. *Native.*

Eulecanium armeniacum, Craw. Dr. Dimmock sent this from Springfield, Mass., infesting *Prunus serotina*. *Native.*

Eulecanium tulipiferæ, Cook, 1878. Probably *E. liriodendri*, Gmel., on *Liriodendron tulipifera* at Springfield, Mass. Coll. Dimmock. *Introduced.*

Saissetia oleæ, Bern., 1782. Found on a small shrub out of doors in the Harvard botanical garden at Cambridge, Mass. *Introduced.*

Saissetia, sp., resembling *oleæ*, but not that species, was found at the same place in one of the greenhouses, on *Cycas revoluta*, but not sufficient for proper study. *Introduced.*

Eulecanium pruinosum, Comst., M. S. Coql., 1891, was found on *Prunus domestica*, var. *Bradshawi*, at the Harvard botanical garden, Cambridge, Mass. *Native.*

Lecanium longulum, Dougl., on *Monstera deliciosa*, in the Harvard tropical greenhouse, Cambridge, Mass. *Introduced.*

Lecanium melaleucæ, Mask., 1898, at the same place and on the same plant. It is new to North America. *Introduced.*

Eulecanium pyri, Schr., was found on pig-nut hickory at Andover, Mass. Although there were apple trees near by, none of these scales were found on them. *Introduced.*

Eulecanium Kansasense, Hunter, 1899, described from Kansas on *Cercis Canadensis*, was found on shadbush at Methuen, Mass. *Native.*

Eulecanium Websteri, Ckll. and King, 1901. This has been found

on high-bush blueberry and *Spiræa* at Lawrence, and on white birch at Methuen, Mass. *Native.*

Pulvinaria Cockerelli, King, 1899. A common species on *Spiræa salicifolia* and *Prinos verticillatus* at Lawrence and Methuen, Mass. *Native.*

Pulvinaria acericola, W. and R., 1868. This was found by Dr. Dimmock at Springfield, Mass., on maple in deep woods. *Native.*

Pulvinaria phaiæ, Lull., 1899 (probably identical with *P. floccifera*, Westw.), was found by Mr. Cooley in the college greenhouse at Amherst, Mass., on orchid *(Phaius maculatus). Introduced.*

Aspidiotus abietis, Schr. *A. pini* is the same. This was found on pine at Forest Hills, Mass. (Mus. Comp. Zool.). It was communicated by Mr. Samuel Henshaw to Mr. Cockerell. *Introduced.*

Aspidiotus rapax, Comst., 1881. Found on *Coprosma Baueriana* at the Harvard botanical garden, Cambridge, Mass. *Native.*

Aspidiotus Britannicus, Newst., 1898. Described from England in 1898, and the same year was found at Salem, Oregon, on holly, and in 1900 found in abundance on holly at the public gardens, Boston, Mass. *Introduced.*

Aspidiotus juglans-regiæ, Comst., 1881, was found on English walnut at Methuen, Mass. *Native.*

Aspidiotus latanicæ, Sign., 1869, was found on an unknown plant in the greenhouse of the Harvard botanical garden, Cambridge, Mass. *Introduced.*

Diaspis carueli, Targ., 1868. Very abundant on *Juniperus sphærica* at Fort Hills, Mass. Coll. S. Henshaw and by the writer on *Thuja occidentalis* at the Boston public gardens, and was previously found by Mr. J. G. Jack at Jamaica Plain, Mass., on *Juniperus sphærica. Introduced.*

Diaspis minima, Targ., was found on *Biota (Thuja) orientalis* in the Harvard botanical garden, Cambridge, Mass. The tree is a native of China, and the scale is new to North America. *Introduced.*

Diaspis cacti, Comst., 1883. This has been found on the plants in the greenhouse of the Agricultural College at Amherst, Mass. Probably *introduced.*

Chionaspis corni, Cooley, 1899. Found at Reading, Mass., on *Cornus paniculata* and *C. alternifolia*. Probably *native.*

Chionaspis salicis-nigræ, Walsh, 1867. A common species found at Huntington, Bedford, Malden and Lawrence, Mass. Its food-plant is

various, and seems to be a general feeder, commonly found on willow, cottonwood, dogwood and shadbush. *Native.*

Chionaspis Americana, Jhn., 1896. This is found on elm at Amherst and Springfield, Mass. *Native.*

Chionaspis ortholobis, Comst., 1881. Dr. Dimmock has found this at Springfield, Mass., on poplar and butternut. *Native.*

Hemichionaspis aspidistræ, Sign., 1869. This was found in destructive numbers on a fern *(Davallia Moorei)* in the Harvard botanical greenhouse at Cambridge, Mass. *Introduced.*

Ischnaspis longirostris, Sign., 1882. Found by Mr. Samuel Henshaw in a greenhouse at Boston, Mass., on *Monstera*, sp. *Introduced.*

Parlatora Pergandei, var. *camelliæ*, Comst., 1883, was found by Mr. J. W. Folsom at the Harvard botanical gardens, Cambridge, Mass., and communicated to Mr. Cockerell. *Introduced.*

Bibliography.

Cockerell, T. D. A., 1899, Journal New York Ent. Soc., Vol. 7, p. 258, gives descriptive notes on *Aspidiotus Forbesi*, Johnson, found on *Acer pseudoplatanus* at Reading, Mass. Coll. Kirkland, Feb. 24, 1898.

Cockerell, T. D. A., 1899. Science N. S., Vol. 10, July, No. 238, p. 86–88. A reply is given to Mr. Marlatt's "Some sources of error in recent work on *Coccidæ*."

Cockerell, T. D. A., 1900, Psyche, Vol. 9, p. 44, gives a table for the determination of all the known North American species of the genus *Kermes*. (Since published three other species have been described.)

Cooley, R. A., 1899. Special Bulletin Mass. Agr. Coll., Aug. 10, 1899. The Coccid *Genus Chionaspis* and *Hemichionaspis*, *Chionaspis corni*, *C. salicis-nigra*, *C. pinifolii*, *C. furfurus* and *C. Americana* are cited from Mass.

Howard, L. O., 1889. Insect Life, Vol. 2, p. 34. A new imported elm insect, *Gossyparia ulmi*, is described. Localities, food-plants are given and cited as found at Cambridge, Mass., by Mr. J. G. Jack, in 1897.

Howard, L. O., 1892. Insect Life, Vol. 5, p. 51. *Gossyparia ulmi* is again found at Malden, Mass., by Mr. C. H. Rowe.

Howard, L. O., 1895. Insect Life, Vol. 7, p. 360. A new locality for the juniper scale at Jamaica Plain, found by Mr. J. G. Jack. (The above three quotations were overlooked in my first list.)

King, G. B., 1899. Psyche, Vol. 8, p. 417. *Pulvinaria Cockerelli*, n. sp., is described, found at Methuen and Andover, Mass.

King, G. B., 1900, CANADIAN ENT., Vol. 32, p. 9, gives the bibliography of the Mass. *Coccidæ* up to Aug., 1899.

King, G. B., 1900. CANADIAN ENT., Vol. 32, p. 214. The *Coccidæ* of the ivy, eleven species are cited, several of which were found in Mass.

King, G. B., 1900. Psyche, Vol. 9, p. 78, 84. The genus *Kermes* of North America, 15 species are cited and tables given; two new species are described by Prof. Cockerell and King. (Since the above paper appeared there has been one other new species described by Prof. Bogue.)

King, G. B., 1900. Psyche, Vol. 9, p. 116–118. Miscellaneous notes on *Coccidæ* from Western Mass., 22 species are cited found by Dr. Dimmock.

King, G. B., 1901. Psyche, Vol. 9, p. 153. The *Coccidæ* of the Harvard botanical gardens, 19 species are listed, with notes on the species.

King, G. B., 1901. Entomological News, Vol. 12, p. 50. *Lecanium caryæ*, Fitch. The species are described, with notes on localities and food-plants.

King, G. B., 1901. CANADIAN ENT., Vol. 33, p. 106–109. *Lecanium Websteri*, n. sp., with notes on allied forms and table to separate the species. *Lec. Kansasense* and *L. Websteri* are also found in Mass.

Additional Check List.

Dactylopius nipæ, Mask.
Kermes Pettiti, Ehrh.
" Andrei, King.
" Perryi, King.
Lecanium lauri, Boisd.
" longulum, Dougl.
" melaleucæ, Mask.
Eulecanium cerasifex, Fitch.
" quercitronis, Fitch.
" armeniacum, Craw.
" tulipiferæ, Cook.
" pruinosum, Coqul.
" pyri, Schr.
" Kansasense, Hunter.
" Websteri, Ckll. & King.
Pulvinaria Cockerelli, King.
" acericola, W. & R.
" phaiæ, Lull.
Aspidiotus abietis, Schr.
" rapax, Comst.
" Britannicus, Newst.
" juglans-regiæ, Comst.
" lataniæ, Sign.
Diaspis carueli, Targ.
" minima, Targ.
Diaspis cacti, var. calyptroides, Costa.
Parlatoria proteus, var. Pergandei, Comst.
Chionaspis corni, Cooley.
" salicis-nigræ, Walsh.
" Americana, Jhns.
Hemichionaspis aspidistræ, Sign.
Ischnaspis longirostri, Sign.
Saissetia oleæ, Bern.
" sp.

THE ECOLOGY OF INSECT SOUNDS.

BY FRANK E. LUTZ, UNIVERSITY OF CHICAGO.

"Ecology," as it is coming to be universally considered, is the science of cause. It is constantly asking "Why?" and not until we can answer "because," have we solved a problem in Ecology. It is the capping stone of the other branches of biological investigation. Morphology describes an organ or character; physiology shows us how it works and what it does; ecology, building on these, tells how and why the character or organ arose. It, then, must be considered as more than the old Natural History. Although the value of the latter cannot be overestimated, more must sooner or later be done.

This is well illustrated in the case of insect sounds. No biological subject has been more written about in popular publications—prose and poetry alike being noisy with references to the insect musicians. A large amount of strictly scientific work has also been done, and while there is much still to do, we, nevertheless, have a fairly clear idea of the anatomy of sound-producing organs, their taxonomic distribution (1), the methods of using them, some of the influences of external conditions (2), and many hypotheses as to functions of the sounds. But we know comparatively little as to why a cricket, for instance, stridulates with his wings, while a beetle rasps with his abdomen, or a cicada possesses such a complicated musical apparatus.

The translation (3) of J. Portchinsky's ('86) paper in Horæ Societatis Entomologicæ Rossicæ, Vol. XX., pp. 111–127, has, however, suggested a fruitful line of investigation. Considering the Orthoptera, he calls attention to the fact that the Acrididæ—unlike their relatives, the crickets and the long-horned grasshoppers—do not stridulate with their wings, but rub "the femur against the raised meshwork of veinlets upon the tegmina." Another striking difference between this family and the other families of the order is that here, alone, we get the bright colouring of the inner surface of the hind legs. These are often the only bright colours the insect possesses. It has become an axiom that insects are constantly endeavouring to show their beauty—especially if it be a secondary char-

(1) Swinton, Insect Variety.

(2) Dolbear, A. E., Amer. Natur., Vol. XI., No. 371, pp. 970-971. Riley, C. V., Proc. Amer. Assoc. Adv. Science, XXXIV., 1885, pp. 330–332. Scudder, S. H., Proc. Bost. Soc. Nat. Hist., Vol. XI., 1868, pp. 306–313 and 316.

(3) Ent. Record and Journal of Var. (1901), Vol. XIII., No. 9.

acter, as grasshopper colours often are—and in the case of the Acrididæ this can only be done by twisting their hind legs about. Such a motion would necessarily result in friction between the femur and the tegmina, friction in irritation and increased growth, and this growth is the sound organ.

An interesting analogy which he does not mention is found in the subfamily, Œdipodinæ. Lugger (4), in describing the Œdipodinæ, said: "The insects belonging here are mostly large and showy, often possessing bright-red, yellow or even blue wings, with black bands. Nearly all the bright-coloured locusts found in the United States belong to this subfamily; most of them are very conspicuous objects in flight, when they show their colour, which is at other times entirely hidden. Œdipodinæ are also very noticeable on account of the rattling noise which the males of most species produce in flight." The connection here between sound and something to be called attention to is quite marked, and while it is about as hard to tell which came first—colour or sound—as it is in the proverbial case of hen or egg, doubtless Portchinsky would say that the sound was originally caused by the vigorous beating of the insect's wings in its amorous display, and is as much a secondary matter as the femora-tegminal stridulation.

We know that under sexual excitement many insects constantly vibrate their wings, expanding and contracting them, and swell their body to its fullest extent. It is easy to suppose that formerly male crickets, having no bright colours to display, made the most of such motions, elevated their tegmina and nervously vibrated them. The tegmina of the two sides would necessarily rub together, and the result would be the same as in the case of the Acrididæ, except for the position of the organs. Of course, if sounds are of any value at all in sexual selection, better sounds are of more value, and so these males, possessing wings well fitted for producing a noise, would win and transmit their exceptional characters. The same applies to the Locustidæ.

But passing to the other groups, we find that sounds are not always concerned with love-making. In a recent journal (5) Babb has described the stridulation of *Passalus cornutus*. In this case the abdomen is raised, rubbing against the wings when the insects are disturbed. Both males and females stridulate, and he was "led to the conclusion that it is evidence of the insect's displeasure at being disturbed, and not a sexual

(4) Third annual report of the Entomologist of the University of Minnesota.

(5) Entomological News, Vol. XII., No. 9, Nov., 1901.

call." Now, it is a common trick among insects to raise the abdomen when disturbed, and if any structures are in the way they will be rubbed, and the insect will make a noise whether he wants to or not. Such rubbings, in time, bring about physiological changes resulting in "organs." These organs are simply modified hairs, and the position of such modifications depends on the parts rubbed; in this case, the abdomen and the parts of the wings next to it.

If some often-repeated motion rubs together the pro- and meso-notum (e. g., in *Cerambycidæ*), a rasping organ will appear there; if it be the pro- and meso-sternum *(Omaloplia brunnea)*, or the elytra and the abdomen *(Elaphrus)*, or the hind wings and the elytra *(Pelobius Hermanni)*, we will find rasping organs there, as long as the physiological law holds that irritation produces excessive growth. Why this law is true is a physiological question. When this motion is made as a result of fear, anger, sociability or love, it will be sure to express fear, anger, sociability or love, as the case may be.

If we may be allowed to thus expand the idea presented so neatly by Portchinsky, the logical conclusion is that many or most insect sounds are the necessary concomitants of certain motions, not the object of the motions; and that the sound organs are callouses or growths caused by the friction, possibly perfected by natural selection.

SUPPLEMENTARY NOTE ON BURTIA.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

In reference to my remarks on the genus Burtia, published in the CAN. ENT. for Dec., 1901, I have received the following communication:

MY DEAR SIR,—Re *Burtia* vs. *Gundlachia*, the latter name is the property of a genus of Mollusca. In a paper on the nomenclature of some Hymenoptera, in the "*Entomologist*" a few years ago, I explained this very matter. There is a citation of it under Lepidoptera in Zoological Record, so it should have been easy to find it. Yours,

THEO. D. A. COCKERELL.

This efficiently settles the matter. The Cuban genus of Lepidoptera must be known as BURTIA, Grote, July, 1866. The two species are *B. rubella*, Grote, and *B. concuta*, H.-S. Sir Geo. Hampson having also distinguished the two genera, Burtia (Gundlachia) and Didasys, the reference in the Philadelphia List is incorrect.

SOME NEW PARASITIC HYMENOPTERA.

BY H. L. VIERECK, PHILADELPHIA.

Hammaniella relativa, n. sp. — Face and dorsum subopaque, punctured, front opaque, the pleura more shining, longitudinal raised line on metapleura distinct, terminated abruptly, the mesothorax not appearing sharply truncate. The longitudinal medial lines on metanotum converging.

♂.—Length 14 mm. Clypeus with a few punctures, somewhat shining, transversely impressed, anteriorly though not strongly. Face closely punctured, front opaque. Cheeks impunctate on the eye margin, otherwise with distinct, small, separated punctures, shining malar space punctured, opaque. Dorsulum almost opaque, the punctures tolerably small, closely arranged. The scutellum more strongly punctured. Mesopleura shining, with well separated, to smaller closer punctures. Metanotum with converging, crude, longitudinal medial carinæ becoming obsolete before the apical margin, transverse carina strong. Metapleura separated from the metanotum by a distinct raised line, which stands out prominently, being margined on each side by a more or less distinct channel. Wings subhyaline, with a dullish cast. Areolet imperfectly trapezoidal in form, the petiole shorter than any of its sides, one-half of the curved and longest side of the areolet, one-half of the second recurrent nervure and a short distance of cubito-discoidal nervure, hyaline; stigma and nervures almost uniformly light brown, base of the wings yellow. First dorsal segment strongly punctured, the spiracles distinctly produced, the succeeding dorsal segments becoming less and less punctured, to almost smooth.

Black: face, clypeus and mandibles excepting apex, four anterior femora, tibiæ and tarsi, a pointed mark on anterior part of the dorsum, two dots on scutellum, extreme base and apex of posterior femora and the posterior tibiæ excepting apex, ochraceous. Tegulæ, one spot aside and below them, coxæ and trochanters of four anterior legs, part of posterior coxæ and trochanters, yellow. On the posterior legs the greater part of femora, apex of tibiæ and all of tarsi are more or less dark brown. Apex of first dorsal segment somewhat claret-brown, the second, third, fourth and greater part of fifth mostly ferruginous.

Type: Coll. Am. Ent. Soc., Phila.

Type locality, New Jersey.

Two males; the co-type from Massachusetts, has a length of 12 mm.

The Massachusetts specimen was cited under the description of *Lampronota varia*, Cress. (Trans. Am. Ent. Soc., III., 164, ♂), as a variety. *Varia*, however, is a quite constant species, a series of twelve specimens showing no great extremes either in sculpture or coloration. The metathorax of *H. relativa* is very distinct from that in *varia*, which lacks longitudinal lines, and is more finely and uniformly sculptured otherwise. The yellowish cast of the wings and yellowish abdominal ornamentation is also characteristic of *varia*, and offers a good superficial difference for separating these two species.

Nadia apalachia, n. sp.—Head and thorax more or less finely and closely punctured. Mandibles heavy and incurved. Abdomen finely sculptured. Areolet sessile.

♂.—Length 10.5 mm. Clypeus with a few strong punctures, elevated transversely. Face closely, indistinctly punctured, opaque, front also opaque, punctures well separated. Cheeks somewhat shining, minutely sculptured and with sparse punctures. Mandibles heavy, incurved rather strongly. Flagellum thirty-four jointed. The superior half of propleura distinctly punctured, somewhat shining, the inferior half obscurely sculptured, opaque. Punctures of dorsum very close anteriorly, more separated posteriorly, from opaque to faintly shining. Scutellum arched, somewhat impressed on each side, closely punctured. Mesopleura with an abbreviated longitudinal raised line anteriorly, not so distinct, the integument punctured somewhat like dorsulum, the punctures closer and finer below than above. Metathorax gently rounded, almost uniformly, very closely punctured. The division between the metanotum and metapleura only indicated by a very faint impression. Wings hyaline, with a faint yellowish cast. The first and second transverse cubiti uniting on the radius, forming an acute angle. Stigma and nervures almost uniformly light brown. First dorsal segment opaque, with fine, close punctures, the spiracles not strongly protuberant, the remaining dorsal segments more finely sculptured, the apical ones becoming shining. Almost uniformly pubescent, abdomen sericeous. Black: mandibles except base and apex, clypeus, face, part of the scape, a pointed mark on anterior margin of dorsulum, base of the wings, tegulæ, a spot aside and below, a spot on scutellum, four anterior legs more or less, apex of posterior coxæ, apex of femora, the tibia excepting apex (more or less), and tarsi yellow. Part of posterior

trochanters and greater part of femora deep brown. Flagellum, apex of first and all of second, third and fourth dorsal segments, ferruginous.

Type : Coll. Am. Ent. Soc., Phila.

Type locality, Connecticut.

Two male specimens ; in the co-type there is a transverse, median black belt on the second dorsal segment.

Cidaphurus Cressonii, n. sp.—Head and thorax opaque, spine on scutellum rudimentary. Wings subfuscous. Colour pattern much like in *Cidaphurus superbus.*

♀.—Length 13.5 mm. Clypeus moderately emarginate, slightly impressed medially, sparsely punctured. Face indistinctly sculptured, punctures separated and distinct on a longitudinal median line, to the sides indistinct, and forming faint ripples. Cheeks more shining and with sparse minute punctures. First joint of the flagellum about as long as the following two united. Dorsulum closely punctured, the punctures closer and finer posteriorly, a somewhat shining line extending from the anterior border to the middle, medially. Mesopleura with regular separated punctures. Scutellum shining, closely punctured, spine rudimentary. Metanotum coriaceous. Superior posterior angle margined laterally. Metapleura closely punctured, somewhat shining. Median and marginal cells subfuscous, the rest of the cells paler. Stigma and costal nervure pale, the other nervures brown, second cubitus basally and first and second recurrent nervures apically interrupted by a transparent space, first and second cubitus uniting on the radial nervure, second recurrent nervure received by the areolet before the middle. Abdomen shining, polished apically, first segment closely punctured, the punctuation of succeeding segments sparser. Head yellow ; malar space, a line from clypeus to insertion of antennæ, and branching out behind insertion, a line on vertex from eye to eye, and occiput, black or nearly so ; scape behind and flagellum dark brown. Anterior and posterior margins of prothorax, a loop on each side of dorsulum, tegulæ, a line below, nearly one-half of mesopleura, scutellum, greater part of metathorax, apical border on first, second, third and greater part of remaining dorsal abdominal segments, greater part of four anterior legs, apical trochanter, and basal half of tibiæ in posterior legs, more or less yellow. A broad median belt extending more than half way back on dorsulum from the anterior margin, mesopleura posteriorly and metanotum anteriorly, and base of first dorsal abdominal segment, black.

Related to *Cidaphurus superbus*, Cress.

Type : Coll. Am. Ent. Soc.

Type locality, Massachusetts.

One female specimen. I take pleasure in naming this fine species after Mr. E. T. Cresson.

AN ABERRATION OF ACTIAS LUNA.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

My friends have not always forgotten me, but have occasionally sent me live Saturnian chrysalids, spun up no doubt with the intention of the insect to emerge in America. Instead, the poor deluded creatures appeared as moths in my German room, allowing me to deceive myself for the moment that I was at home. *Cynthia*, *promethea*, *cecropia*, *polyphemus*, *io* and even *imperialis*, came out just as in America. The only difficulty I had was with my few cocoons of *luna*, the moths in some cases failing to expand their wings. But, if my memory does not fail, this accident happens also more especially with *luna* in the breeding cage at home. Among the examples which emerged here is one small male, expanding 78 mil., which is the most curious example of the species I remember to have seen. The wings are almost perfectly expanded, a little unevenness of the costa of the right primary, which is somewhat concave, and a slight crumpling of the costal region of both secondaries, are traces of retarded development ; the "tails" are fully out. The eye spot on the left primary is interlined with red, and the spot itself is connected by a reddish-purple bar with the purple costal margin. On the right primary the suffusion of the eye spot with purple is entire, and a wider reddish-purple bar fuses it with the costal band. This bar is finely edged with black outwardly and gives the appearance of the eye spot being distorted. On the outer margins the reddish terminal band is very distinct (var. *dictynna*). But the most curious feature is the appearance over the eye spot of the right secondary (the wings on the right side are the more abnormal) of a straight purple bar, intersecting the eye spot over the middle and projecting somewhat before and behind it. The eye spot on the left secondary is normal, and there is no other apparent deviation, except that on the under surface all the four eye spots are suffused with reddish-purple. There are some blackish discolorations on the hind wings, accidentally caused, I think, by body fluids.

I have exhibited the specimen at Frankfort and at other entomological meetings here, but the species not being well known, it excited but a passing interest. I would have sent the specimen to America, but hope to live to bring it myself.

NOTES ON THE MOUTH-PARTS OF BOMBUS.

BY T. D. A. COCKERELL AND JOHN M'NARY, E. LAS VEGAS, N. M.

We have lately studied the mouth-parts of a number of species of Bombus, both American and European, and adding our results to those obtained by Radoszkowski (1877) we find as follows :—

(1) Taking the first joint of the labial palpus of the ♀ as an index of the length of the mouth-parts (it is especially convenient for accurate measurement), we find that the longest-mouthed species is *B. Gerstackeri*, from the European Alps (our examples were collected by Friese at Engelberg), a species known to be the exclusive visitor of *Aconitum lycoctonum* in that region. The *Aconitum* (Knuth, Blütenbiologie, Vol. II., p. 53, fig. 20) has the hood enormously produced, and is adapted only to bees with extremely long tongues.

(2) No Rocky Mountain or other American *Bombus* examined by us has nearly such long palpi (or tongue) as *B. Gerstackeri*, nor have we such an Aconite as *A. lycoctonum*. Our longest-tongued type seems to be *B. Nevadensis*, which visits *Delphinium*.

(3) The species with shortest mouths are mostly high-alpine or arctic: *proximus*, *melanopygus*, *lapponicus*, *viduus*. *B. terrestris* also ranks with these as one of the shortest-mouthed ; it is remarkable that the species which superficially looks exactly like *B. terrestris*, namely, *B. hortorum*, is one of the longest-mouthed of all, having the first joint of labial palpus about 6½ mm. long. We have both *terrestris* and *hortorum* from Innsbruck, collected by Friese.

(4) *B. ligusticus*, *ruderatus* and *ussurensis* rank with the longest-mouthed species, and probably, like *Gerstackeri* and *hortorum*, are adapted to *Aconitum*.

(5) The commonest length for the first joint of the labial palpi is from 4 to 4½ mm. Here come *B. juxtus*, *Morrisoni*, *rajellus*, *muscorum*, *senilis*, *fragrans*, *equestris*, *sylvarum*, *Stewenii*, *Latreillelus*, *Mlocosewiczi*, *calidus*. The American *virginicus* and *Kincaidii* fall short of this by a small amount, although they are large bees.

(6) The second joint of the labial palpi does not usually enlarge in proportion to the first, hence the longest-mouthed species have the greatest difference between the joints. In such species as *ruderatus*, *ussurensis*, etc., the first joint is from 5½ to 6 times as long as the second. In nearly half the species, the first joint is from 4 to 4½ times as long as the second ; in *proximus* it is only 2½ to 3 times as long. In *Gerstackeri* the

second joint has lengthened in proportion to the first, so that the average proportions are preserved, although the palpi are extremely long. In *B. sonorus* the first joint is relatively short (about as long as in *pratorum*, *hypnorum*, etc.), but it is nevertheless over 4½ times as long as the second.

(7) It seems probable that the only oligotropic bumble-bees are those with extremely long tongues, adapted to certain species of aconite. The American species probably all visit miscellaneous flowers, and this must be especially true of the Arctic species, which have nearly a monopoly (so far as bees are concerned) of the flowers of their region. Thus, *B. Kincaidii* is the only bee on the Pribiloff Islands, where brightly-coloured flowers abound.

NOTE ON PITYOPHTHORUS CONIPERDA, SCHWARZ.

BY W. HAGUE HARRINGTON, OTTAWA.

This species was described in the Proceedings of the Entomological Society of Washington, Vol. III., p. 144, 1895, and the author stated: "I offer herewith a description of this species, being solely tempted thereto by the interest attached to its life-history; for, as far as I am aware, there is no other Scolytid known which normally develops within the cones of pine trees." Possibly since that time a similar habit may have been observed in regard to other members of the Scolytidæ, but I cannot recall any reference to such observations. The beetle in question was first collected by me on May 24, 1884, and its capture was quite accidental. Mr. Fletcher and myself had that day visited a grove of white pines on the Gatineau, a few miles north of Ottawa, with the special object of collecting the somewhat rare little butterfly, *Thecla Niphon*, of which we succeeded in capturing several good specimens. Having climbed up into one of the pine trees, to try and net a butterfly which had settled up aloft, I noticed that the young buds at the tips of the twigs were injured by some insect. Investigation showed that one of the bark-boring beetles was at work, and a few specimens were collected. These were determined for me as *Dryocœtes affaber*, and were referred to by me under that name in notes on Canadian Rhyncophora in the CANADIAN ENTOMOLOGIST, 1891, Vol. XXIII., p. 26. At Aylmer, Que., about eight miles above the city, on the Ottawa River, on June 25, 1887, while seeking, with my friend Fletcher, upon red pines for *Podapion gallicola*, we found the shoots and cones seriously infested by a Scolytid, which appeared

slightly larger, but which proved to be the same species. The infested cones were shrivelled and hard, and their development was entirely arrested. The following year similar observations were made in the same locality, and similar infestations were noted in subsequent seasons. On May 26, 1901, I examined some white pines not far from the locality where the beetle had been first noticed in 1884, and found that there was a serious infestation of the cones. The ground beneath the trees was strewn with aborted and undeveloped cones, which were compact and hard, about three inches in length, but only one-half inch in diameter. On breaking open any one of these, *P. coniperda* was apparent and its burrows running through the resinous compacted scales. In one cone I observed a small bright Chalcid, but, unfortunately, it dropped in the grass and was lost, much to my regret, for it was evidently a parasite of the beetle. With the hope of obtaining specimens of the Hymenopteron, I took home some of the cones, but no flies appeared. After it was apparent that there was no probability of any insects emerging, I broke up the cones, which was not an easy matter, owing to their hard, resinous condition, but could find no trace of any of the parasites. Some beetles were obtained (all dead), but many of them were broken in digging them out of their burrows or in tearing apart the cones. As was mentioned in my former note on this species, the beetles remain continually in the cones; none of them emerged of their own accord. While other members of our Scolytidæ may be found flying about, some species in great abundance, I have never met with this species at large, although it must be fairly abundant and widely distributed. Probably on account of this habit of concealment, it does not fall a frequent prey to our collectors, as I have not found it in collections sent to me for examination. That excellent entomologist, the late Dr. John Hamilton, with whom I had the privilege of corresponding for several years, obtained the species at Sparrow Lake, Ont., and published an interesting note upon it in Canadian Entomologist, 1893, Vol. XXV., p. 279. The species is not so destructive as many others of the Scolytids, but apart from its arresting the growth of the cones and the development of the seeds, it causes a certain amount of injury by its infestation of the young shoots. Schwarz records it from Michigan, Virginia, New York and Pennsylvania, proving that its range is an extensive one. I may add that my only specimens of true *Dryocœtes affaber* (determined by Dr. Hopkins) occurred upon spruce.

LARVA OF DATANA, UNKNOWN SPECIES.

During my last week of collecting in the Huachuca Mts., Cochise Co., Arizona, I found, Aug. 11th, 1899, eighteen *Datana* larvæ on a Manzanita bush *(Arctostaphylos glauca)* or Western bearleaf. This larva was not known to me, and therefore I was anxious to send it to the artist who made the figures for Prof. A. T. Packard's "Bombycine Moths." To all appearance the larvæ were nearly full-grown, and I had a negative taken of them by an ornithologist camping near by, so as to have a memento left in case they should transform before reaching their destination. Cloudy weather and drizzling rain late in the day made it difficult to obtain a good picture. I had to mail the insects early the next morning from Fort Huachuca, which is 12 miles from Ramsey Canyon, and further delay was hazardous. I took a hasty description of the larva, then boxed two of them in a tin canister for Mr. L. H. Joutel, the artist, care of American Museum of Natural History of New York City. But, unfortunately, these larvæ, although received, were never turned over to the artist, whose address I could not find in my notebook. The other sixteen larvæ I sent to Mr. Chas. Palm, then rusticating in Sullivan Co., N. Y., with a view to having these raised on some eastern food-plant. The larvæ refused everything offered, and finally Mr. Palm set them at liberty in the bush, trusting that some might transform there.

Description of larva: Body black, with longitudinal yellow lines, of which three are subdorsal on each side of a broad, black dorsal band, and one sub-spiracular yellow line; another broad, black band between the last subdorsal and spiracular line, of nearly the same width as that on the dorsum. A yellow, central abdominal line from the first to twelfth segment. Head and anal plate pitchy black and smooth. Abdominal protuberance at the base of black legs of a purplish-pink colour. Spiracles black, enclosed by a circular silvery line. All true and abdominal legs pitchy black. Mouth-parts purplish-pink. Long white hairs from 5 to 8 mm. long all over the body, except dorsal black band, on which the hairs were shorter and more scattered.

Length of larva, 35 mm., and width, 5 mm. When at rest the larvæ assumed the usual curved posture, the anterior and posterior three segments well thrown up. R. E. Kunze, Phœnix, Arizona.

A NEW GALL-MAKING COCCID.

BY T. D. A. COCKERELL, EAST LAS VEGAS, N. MEX.

Cryptophyllaspis Rübsaameni, n. sp.— ♀. Orange, oblong, caudal end sunken, overlapped at the sides by lobiform projections; no circumgenital glands; anal orifice broad-oval, about 17 μ long, and distant about 39 μ from the bases of the median lobes; lobes and squames formed just as in *C. occultus* and of the general type of *Aspidiotus cyanophylli*; three pairs of lobes, not even the median ones darkened in the least; median lobes slightly notched on each side; squames narrow and pointed, strongly fringed; beyond the third lobe are three double squames, each having the appearance of two squames united at the base; interlobular incisions with thickened edges, of the *Diaspidiotus* type; two rows of dorsal glands, not very numerous, on each side of the caudal end; spines small.

Galls small, subcylindrical, about 2 mm. long, thickly clustered on leaves of *Codiæum*.

Hab. — Bismarck Archipelago; communicated by Mr. E. H. Rübsaamen. Types in Coll. N. M. Agric. Exp. Sta. and U. S. Dept. Agriculture.

NOTES ON MR. LYMAN'S PAPERS.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

I was much interested by Mr. Lyman's careful paper on a species of *Gortyna*, boring in burdock. If *aerata*, Lyman, is a good American species it should have an alternative food plant, since the burdock is imported from Europe. From Mr. Lyman's detailed statements, the distinction from *necopina* is assured. The differentiation from *nitela* is not so clearly given.

With regard to *nitela*, Mr. Lyman is quite correct, that Guenée first describes *nebris* and then *nitela*; and in my catalogue of 1874 I give the two as distinct species in the above order of their description. But in my Buffalo Check List of 1875 I place *nitela* first; and in 1882 I retain this sequence and record *nebris* as a variety of *nitela*. But I am not agreed with Mr. Lyman that *nebris*, the white-spotted type, represents the original form of the species. I think the white filling in of the ordinary spots a specialization, therefore a variation from the original form of the species. The normal Gortynid ornamentation is probably that shown by

inquæsita, *necopina* and *nitela*. This appears to me a reasonable view when we consider the markings of the Noctuids as a whole.

It is a delicate question whether we should prefer the name given to the variety, when described on the same page as the species, merely because it stands first. I do not think it subserves the practical ends of science. For instance, I prefer the name *Orthosia ferrugineoides* for our common species, and record *bicolorago* as designating the aberration, although the latter stands first in Guenée. It is pushing priority beyond what the law intends. But if *nebris* and *bicolorago* were first described by another author and in another book, their priority for the species would be undoubted.

I was also much interested by Mr. Lyman's paper in the January number. In the Annals of the N. Y. Lyceum N. Hist., Vol. VIII., 1866, will be found a paper by Grote and Robinson, Lepidopterological Contributions, with three coloured plates, in which we originally drew attention to Abbot's figuring two species on Plate 78 of the Insects of Georgia. We then gave the following synonymy on page 374, *l. c.*:

(1) *Lophodonta georgica.*
Phalæna angulosa, Ins. Ga., 78 [83], ♂, upper left-hand figure (1797).
Notodonta georgica, H.-S., Ex. Lep. 384, ♀ (1855).

(2) *Lophodonta angulosa.*
Phalæna angulosa, Ins. Ga., 78 [83], ♀ ?, lower right-hand figure (1797).
Lophodonta angulosa, Packard, P. E. S. P., 358 (1864).

It is not certain that the lower right-hand figure represents a female. We gave particulars which render it possible that this figure also represents the male sex. The name *angulosa* became restricted to this species by Herrich-Schæffer's description of *georgica*.

CHANGES IN ENTOMOLOGICAL FAUNA OF NORTHERN ILLINOIS.

BY F. M. WEBSTER, WOOSTER, OHIO.

Among the ways I find that one can study the changes in the insect fauna of a locality as years go on is to occasionally go back to some such section where one has years ago been familiar with the insects to be found there and note the number of newcomers or, possibly, the passing of some of the old ones, though these last are by far the less numerous of the two.

Recently, while on a visit to my old home in De Kalb county, Northern Illinois, the insects of which I was pretty well acquainted with twenty years ago, but with which I have known little since that time, I was most unexpectedly met with complaints of the Buffalo Carpet beetle, *Anthrenus scrophulariæ*, unheard of there until within a few years, and which I never captured there myself.

Another newcomer was the Box Elder bug, *Leptocoris trivittata*, which I encountered in February, crawling and flying about my room, which had not been kept heated during the winter. This last was not so much of a surprise, as Dr. Forbes, whose monumental works on the insects of Illinois will stand as long as applied entomology itself, told me last fall that it had then nearly or quite crossed the State from west to east. But the thing did certainly look out of place to me where I found it.

Of the old-time injurious species, such as occurred there thirty or forty years ago, there is not one that does not occur there now, though not always in such numbers. The Chinch bug, *Blissus leucopterus*, that I remember back in the fifties, is not as destructive as of old, on account, I believe, of the fact that all uncultivated grounds are now generally pastured during summer, leaving no protection for the bugs during winter.

In most cases great diminution in numbers is most conspicuous among such species as fed on the natural vegetation, and as the land has been underdrained and brought into cultivation, these have disappeared with their food-plants. Thus, *Saperda mutica* and *Plectrodera scalator* have gone the way of the willows upon which they subsisted. *Acmæodera pulchella*, formerly always common on the blossoms of *Rudbeckia hirta*, has become far less so, as the plant has succumbed to the cultivation or pasturing of the land where once they grew abundantly.

The busy, economic entomologist has far too little time to watch these things closely, but it would seem that there was here a field for such as are able to withdraw from the hurry and push of professional work, and quietly and carefully watch these comings and goings mid the insect world, for other States than Illinois offer equally desirable fields for such observations. Not only this, but we not infrequently hear complaints from those who follow some line of business and study insects only as a pastime, that they have no opportunity to collect outside their own narrow field, whereas, here is a phase of entomological study that is really suffering for just such labour as these circumscribed people can best give to it. The data obtained

in this manner are something more than mere gossip, as, if accurately observed and recorded where they are accessible to the busy man, these notes will sooner or later prove invaluable in the study of insect diffusion and disappearance.

BOOK NOTICE.

Insects Injurious to Staple Crops.—By E. Dwight Sanderson. B. S. Agr., Entomologist, Delaware College Agricultural Experiment Station. New York: John Wiley & Sons. (Price $1.50.)

This is a very satisfactory compilation of the information to be obtained from the publications of State Agricultural Experiment Stations and of the Division of Entomology at Washington, regarding a considerable number of insects of practical interest to farmers. The writer lays no claim to originality, but he has succeeded in preparing a useful book, full of information of a trustworthy character, arranged in a convenient manner, and sufficiently illustrated. Some of the photogravures, however, are by no means as clear as one would wish. The book is intended for the use of farmers, and aims at giving them a correct knowledge of the insects with which they may have to contend and the methods that have been found most serviceable for preventing or controlling their injuries. Whether the ordinary farmer can be induced to read and make use of a book of this kind is somewhat doubtful, but if he does it will surely repay him well for any effort he may put forth in doing so.

The work opens with a short account of some of the most startling losses caused by insects, which must give the reader a vivid idea of their importance. After a chapter on the structure and development of insects, there follows a very useful epitome of the methods of intelligent farming, which will be found effective in preventing insect injury. A chapter is devoted to beneficial insects, in order that the farmer may know friend from foe, and the greater part of the book to descriptions and life-histories, together with remedies, of insects affecting various grain crops, corn, clover, cotton, tobacco, hops, potatoes, and sugar beets. The work is completed by an account of the most useful insecticides and the formulæ for their preparation. On the whole, it is an excellent manual, and will be found a handy book for reference by all who are engaged in the practical work of fighting against insect foes.

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CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

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(Paper No. 4.—Continued from Vol. XXXII., 1900, p. 296.)

SUBFAMILY III.—Aporinæ (= Pompilinæ).

1815. Aporida, Leach, Edinb. Encyc. IX., p. 149.

Pompilus, Fabr., is preoccupied, and the family name *Pompilidæ* must be changed to *Ceropalidæ*, as has been shown recently by Fox (*vide* Ent. News, Vol. XII., 1901, p. 268). In consequence, my subfamily *Pompilinæ* must be changed to *Aporinæ*.

This subfamily is unquestionably the largest in number of genera and species of any of the groups of the family *Ceropalidæ* (Pompilidæ). Most of the species, in comparison with those found in the *Pepsinæ*, are of medium size or small, few attaining much over an inch in length, while the vast majority are much smaller.

All of the species, so far as we know, dig burrows in the ground, in which they store up spiders as food for their young. I suspect, however, that some of the genera, judging from their structural characters and the absence of a tarsal comb, will prove to be *inquilinous in the nests of others*, as with the *Psithyridæ*, *Stelididæ* and other families in the Hymenoptera.

The characters made use of in my table of subfamilies readily separate the subfamily. The spiny or strongly bristly legs, which are never smooth nor serrate, and the absence of a transverse grooved line or furrow on the second ventral segment separate it from the *Pepsinæ* and the *Agenioinæ*; the antennæ being placed higher up on the face, and not low down *on* or *below* an imaginary line drawn from the base of the eyes,

or the non-produced clypeus, separate it from the *Planicepinæ* and from *males* in the *Agenüinæ;* while from the *Notocyphinæ* and the *Ceropalinæ* it is separated by the hidden or only partly visible labrum, which is never very large or free, and by other characters.

The *Aporinæ* may be separated into two tribes :

Front wings with *three* cubital cells, the second and third each receiving a recurrent nervure.....Tribe I., Anopliini.

Front wings with only *two* cubital cells, rarely with only one, the second usually receiving both recurrent nervures, rarely receiving only one—the first; head lenticular, the antennæ inserted only slightly above an imaginary line drawn from the base of the eyes.....Tribe II., Aporini.

Tribe I.—Anopliini.

Many new genera have been recognized in this tribe, and I have restored many genera suppressed by various authorities, but I believe these may all be readily separated now by the characters made use of in the following table :

Table of Genera.

Cubitus in hind wings originating *before* the transverse median nervure, the submedian always shorter than the median.....2.

Cubitus in hind wings not originating before the transverse median nervure, either interstitial or originating from *beyond* the transverse median nervure.

Cubitus in hind wings *interstitial*, or very nearly, with the transverse median nervure.....10.

Cubitus in hind wings originating beyond the transverse median nervure.....23.

2. Metathorax posteriorly rounded, *not* impressed, and without a median impressed line or furrow above, or the impressed line very vaguely defined.....7.

Metathorax posteriorly rather abruptly or obliquely truncate, impressed or emarginate, or *with* a more or less distinct median impressed line or furrow above; anterior tarsi in ♀ combed.

Pronotum shorter than the mesonotum; eyes extending close to the mandibles; third cubital cell subquadrangular or trapezoidal, rarely subtriangular.....3.

Pronotum long, as long or a little longer than the mesonotum; eyes not quite extending to base of mandibles, a linear space between; third cubital cell narrowed above or subtriangular;

submedian and median cells equal or nearly; claws in ♀ with a tooth beneath, in ♂ cleft; first joint of flagellum in ♀ not longer than the second, in ♂ shorter.....(1) Ferreola, Lepel.
(Type F. algerica, Lepel.)

3. Head viewed from in front *not* wider than long, usually a little longer than wide, the eyes *not* strongly converging above, although usually slightly converging..... 4.
Head viewed from in front *wider* than long, the eyes strongly converging above.
Claws in ♀ with a median tooth, in ♂ cleft; first joint of flagellum in ♀ longer than the second, in ♂ not longer, about equal; submedian cell in front wings a little shorter than the median.....(2) Batozonus, Ashm., g. nov.
(Type Pompilus algidus, Smith.)

4. Claws in ♀ with a median tooth beneath, in ♂ cleft.....6.
Claws cleft in both sexes.....5.

5. Clypeus in ♀ anteriorly entire; metathorax posteriorly obliquely truncate or more or less impressed; tarsal comb in ♀ long.
Wings black, fuscous or subhyaline; first joint of flagellum in both sexes elongate, longer than the second; basal joint of front tarsi *shorter* than tibia; abdomen usually marked with white.....(3) Spilopompilus, Ashm., g. nov.
(Type Pompilus biguttulatus, Fabr.)
Wings red or ferruginous, the tips black; first joint of flagellum in ♂ not longer than the second; basal joint of front tarsi longer than tibia; abdomen not marked with white, sericeous.....(4) Paracyphonyx, Magretti.
(Type P. metemmensis, Magr.)

6. Clypeus and labrum with a median sinus anteriorly; pronotum with the hind margin arcuately or very obtusely angularly emarginate.
Abdomen wholly black; second joint of front tarsi less than half the length of the first.....(5) Pompilogastra, Ashm., g. nov.
(Type Pompilus aethiops, Cress.)
Abdomen with the second segment marked with red or yellow; second joint of hind tarsi fully half as long as the first.....(14) Arachnophroctonus, Ashm. (part).

7. Metathorax bare or nearly, at least not clothed with a silvery pubescence; claws in ♀ with a median tooth, in ♂ cleft.....8.

Metathorax clothed with a fine, usually dense, silvery pubescence; claws in ♀ cleft, in ♂ with a median tooth.

Submedian and median cells equal, the transverse median nervure interstitial with the basal nervure; third cubital cell large, trapezoidal; mandibles 2-dentate; first joint of flagellum in ♂ as long as the second... ..(6) Sericopompilus, Ashm., g. nov.
(Type Pompilus cinctipes, Cress.)

Submedian cell a little longer than the median; third cubital cell subtriangular; mandibles 3-dentate; first joint of flagellum in ♂ short, shorter than the second.....(7) Nannopompilus, Ashm., g. nov.
(Type N. argenteus, Ashm., M. S.)

8. Pronotum normal and always shorter than the mesonotum .....9.

Pronotum broad and as long as the mesonotum.

Submedian cell in front wings much longer than the median; third cubital cell large, not or only slightly narrowed above.....(8) Hypoferreola, Ashm., g. nov.
(Type Ferreola cephalotes, Sauss.)

9. Wings red or ferruginous, their tips black; third cubital cell subquadrangular or trapezoidal, never distinctly triangular; mandibles 2-dentate, the inner tooth large, acute.....(9) Epizuron, Schiödte.
= Cryptocheilus, Panzer.
(Type Pompilus rufipes, L.)

Wings differently coloured, not red, usually fuscous or subfuscous; mandibles in ♀ 3-dentate, the inner tooth small, in ♂ 2-dentate; body marked with yellow or red.....(10) Poecilopompilus, Ashm., g. nov.
(Type Pompilus navus, Cress.)

10. Metathorax posteriorly rounded, *not* impressed, and *without* a distinct median longitudinal impressed line or furrow above, or this line is very vaguely defined..... .....19.

Metathorax posteriorly truncate, impressed or emarginate, or *with* a more or less distinct median longitudinal impressed line or furrow above.

Third cubital cell triangular, subtriangular, or at least always strongly narrowed above and sometimes petiolate; claws in ♀ with a median tooth, in ♂ cleft..... .....16.

Third cubital cell large, trapezoidal, or at least never distinctly triangular nor petiolate.....11.

11. Claws in ♀ with a median tooth, in ♂ cleft; metathorax posteriorly not striate.....12.

Claws cleft in both sexes; metathorax posteriorly striate.....(11) Pseudoferreola, Radoszk.
(Type P. striata, Radosz.)

12. Transverse median nervure in front wings *interstitial* with the basal nervure, the median and submedian cells of an equal length....14.

Transverse median nervure in front wings *not* interstitial with the basal nervure, the submedian cell more or less distinctly the longer.....13.

13. Clypeus anteriorly truncate or very slightly rounded, *without* a median sinus; body black or blue-black; pronotum posteriorly obtusely angularly emarginate, first joint of flagellum in ♀ longer than the second, in ♂ not or scarcely longer than the second, but at least thrice as long as thick; tarsal comb short and sparse.....(12) Pycnopompilus, Ashm., g. nov.
(Type Pompilus scelestus, Cress.)

14. Clypeus in ♀ with a median sinus, in ♂ simple, the labrum slightly exposed.....15.

Clypeus in both sexes truncate or slightly rounded, *without* a median sinus.

Body black or blue-black, the abdomen partly red; first joint of flagellum very elongate, much longer than the second; posterior face of metathorax concave, the upper and lower angles obtusely dentate; third cubital cell very large, the second quadrangular.....(Siam) (13) Tachypompilus, Ashm., g. nov.
(Type T. Abbotti, Ashm., M. S.)

Head and thorax black, the abdomen towards base marked with red; posterior face of metathorax only slightly impressed; third cubital cell triangular.....(21) Entypus, Dahlb. (part).

15. Abdomen red or marked with red or yellow, rarely wholly black; first joint of flagellum in ♀ elongate, longer than the second; in ♂ short, never longer than the second.....(14) Arachnophroctonus, Ashm., g. nov.
(Type Pompilus ferrugineus, Say.)

16. Third cubital cell small, distinctly triangular, and either petiolate or subpetiolate, rarely elliptical ..... 18.

Third cubital cell larger, triangular or subtriangular, but never petiolate, the marginal cell obliquely truncately pointed at apex ..... 17.

17. Transverse median nervure in front wings interstitial with or originating a little before the basal nervure; pronotum as long or nearly as long as the mesonotum.

Pronotum with the hind margin in ♀ obtusely angularly emarginate, in ♂ arcuately emarginate; first joint of flagellum in ♀ elongate, much longer than the second, in ♂ not longer than the second ..... (15) Schiztosalius, Sauss.
(Type S. Elliotii, Sauss.)

Pronotum with the hind margin in both sexes arcuately emarginate; first joint of flagellum in ♀ short, not longer than the second, in ♂ shorter than the second ..... (16) Sophropompilus, Ashm., g. nov.
(Type Pompilus ingenuus, Cress.)

18. Tranverse median nervure in front wings *not* interstitial with the basal nervure, the submedian cell most frequently distinctly longer than the median ..... 19.

Transverse median nervure in front wings *interstitial* with the basal nervure, the submedian and median cells equal.

Pronotum shorter than the mesonotum, with the hind margin obtusely angularly emarginate (rarely arcuate); first joint of flagellum in ♀ elongate, much longer than the second, in ♂ not longer than the second ..... (17) Pompiliodes, Radoszk.
(Type P. unicolor, Radosz.)

19. Marginal cell not elliptical, but triangularly pointed at apex; claws in ♀ with a median tooth beneath, in ♂ cleft ..... 20.

Marginal cell elliptical; claws cleft in both sexes.

Second and third cubital cells longer than wide, narrowed above; first recurrent nervure interstitial with the second transverse cubitus, the second recurrent nervure joining the third cubital cell a little beyond the middle ..... (18) Lophopompilus Radoszkowski.*
(Type Pompilus grandis, Eversm.)

*I do not know this genus; judging from the shape of the marginal cell, it may probably prove to belong to the *Pepsinæ*.

20. Third cubital cell trapezoidal or, at most, subtriangular, never distinctly triangular or petiolate; abdomen black.....21.
Third cubital cell triangular and petiolate or subpetiolate, especially in the males; abdomen more or less red basally.....22.

21. Pronotum hardly shorter than the mesonotum, the hind margin arcuately emarginate; first joint of flagellum in ♀ longer than the second, in ♂ not longer than the second; tarsal comb not long.....(19) Pompilinus, Ashm., g. nov.
(Type Pompilus cylindricus, Cress.)
Pronotum shorter than the mesonotum, the hind margin obtusely angularly emarginate; first joint of flagellum in ♀ very elongate, longer than the second, in ♂ about equal to the second; tarsal comb long, flexible.....(20) Agenioideus, Ashm., g. n. (part).
(Type Pompilus humilis, Cress.)

22. Pronotum shorter than the mesonotum, the hind margin obtusely angularly emarginate; first joint of flagellum in ♀ elongate, very distinctly longer than the second, in ♂ not or scarcely longer than the second; abdomen usually marked with red or yellowish on basal segments.....(21) Entypus Dahlbom.
(Type E. ochraceus, Dahlb.)

23. Metathorax posteriorly rounded, neither impressed nor obliquely truncate, and usually *without* a distinct median longitudinal impressed line or furrow above, the latter, if present, is very vaguely defined; pronotum rarely much lengthened.....30.
Metathorax posteriorly obliquely truncate or impressed, often concave or subconcave posteriorly; if rounded posteriorly, then the metanotum has a median longitudinal impressed line or furrow.....24.

24. Front tarsi in ♀ *without* a distinct long comb, at most with a scopa of short stiff bristles beneath and a few short bristles at apex of the joints.....34.
Front tarsi in ♀ *with* a distinct, usually long comb; claws in ♀ with a median tooth beneath, in ♂ cleft (rather otherwise and then noted).....25.

25. Submedian and median cells in front wings equal, the transverse median nervure being interstitial with the median nervure.....26.
Submedian cell in front wings longer than the median.....29.

26. Third cubital cell trapezoidal, usually as large or nearly as the second.....28.

Third cubital cell in front wings triangular or subtriangular, smaller than the second and sometimes petiolate.....27.

27. Body wholly black, but more or less distinctly clothed with a silvery or sericeous pubescence; first and second joints of flagellum in both sexes equal or very nearly...(22) Anoplius, Lepel. (Dufour).
(Type Pompilus nigerrimus, Scopoli.)

Body not wholly black and not clothed with a silvery pubescence, the abdomen smooth, shining, always red at base; first joint of flagellum in ♀ longer than the second, in ♂ about equal.....(24) Arochnophila, Ashm., g. nov.
(Type Pompilus divisus, Cress.)

28. Body wholly black, usually more or less clothed with a silvery pubescence; first joint of flagellum in ♀ longer than the second, in ♂ not longer that the second..(23) Aporoideus, Ashm., g. nov.
(Type Pompilus sericeus, V. de Lind.)

29. Pronotum with the hind margin obtusely angularly emarginate; first joint of flagellum in ♀ always longer than the second, in ♂ sometimes shorter.....31.

Pronotum with the hind margin arcuately emarginate.....30.

30. Body in ♂ usually clothed with a silvery pubescence; third cubital cell triangular, usually petiolate, especially in males.....(19) Pompilinus, Ashm.
(Type Pompilus cylindricus, Cress.)

31. Body black and usually *with* a more or less distinct silvery pubescence, especially in males; abdomen black, immaculate; third cubital cell triangular and often petiolate or subpetiolate.....(22) Anoplius, Lepel. (Dufour.)
(Type Pompilus nigerrimus, Scopoli.)

Head and thorax usually black, but without a silvery pubescence, the abdomen smooth and shining, always red basally; third cubital cell variable, sometimes triangular and petiolate.....(24) Arachnophila, Ashm., g. nov.

32. Pronotum with the hind margin obtusely angularly emarginate..33.

Pronotum with the hind margin arcuately emarginate.

33. Submedian cell in front wings a little longer than the median; third cubital cell trapezoidal or narrowed above, never distinctly triangular or petiolate; mandibles in ♀ 3-dentate, in ♂ 2-dentate.

Third cubital cell usually a little smaller than the second; first joint of flagellum in ♀ longer than the second, in ♂ not longer than the second, about thrice as long as thick; claws in ♀ with a median tooth, in ♂ cleft..(25) Aphiloctenus, Ashm., g. nov.
(Type Pompilus virginiensis, Cress.)

Third cubital cell larger than the second; first joint of flagellum in ♀ elongate, nearly as long as 2 and 3 united, in ♂ not or scarcely longer than the second, but about four times as long as thick; claws cleft in both sexes....(26) Hemisalius, Sauss.
(Type H. albistylus, Sauss.)

Tribe II.—Aporini.

The front wings with one or two cubital cells, never three as in the tribe Pompilini, and the slight difference in the insertion of the antennæ, will readily distinguish the tribe.

The group comes quite close to the subfamily *Planicepinæ*, in which are found forms with only two cubital cells in the front wings, so that the closest attention must be given to the characters used in separating the subfamilies or the student will go astray and confuse some of these forms with genuine *Aporini*.

Table of Genera.

Metathorax posteriorly rounded, the hind angles unarmed.....2.

Metathorax posteriorly truncate, depressed or emarginate, the hind angles more or less distinctly produced into conical teeth or spines.

Cubitus in hind wings usually interstitial or nearly; tarsal comb present; claws with teeth; mandibles 3-dentate.....(1) Aporus, Spinola.
(Type A. unicolor, Spin.)

2. Cubitus in hind wings originating *beyond* the transverse median nervure.....4.

Cubitus in hind wings interstitial with the transverse median nervure.....3.

3. Transverse median nervure in front wings interstitial with the basal nervure; tarsal comb in ♀ present; claws toothed and combed; mandibles 2-dentate.....(2) Evagetes, Lepeletier.
(Type Pompilus bicolor, Fabr.)

4. Transverse median nervure in front wings uniting with the median vein *beyond* the origin of the basal nervure.....5.

Transverse median nervure in front wings interstitial or uniting with the median vein *before* the origin of the basal nervure..... 6.

5. Hind margin of pronotum arcuate; antennæ rather thick: front tarsi with a comb; claws in ♀ with a tooth beneath, in ♂ cleft; second cubital cell receiving one recurrent nervure, the second recurrent joining the cubitus *beyond* the second transverse cubitus.....(3) Actenopoda, Ashm., g. n.
(Type A. Rileyi, Ashm., MS.)

6. Front tarsi combed; claws cleft, without or, at most, with only a rudimentary comb..... 8.

Front tarsi *not* combed; claws with a tooth and combed.....7.

7. Pronotum not large, the hind margin obtusely angularly emarginate; second cubital cell triangular .....(4) Xenaporus, Ashm., g. n.
(Type Pompilus amoenus, Klug.)

8. Front wings with two cubital cells; hind margin of the pronotum obtusely angularly emarginate.....(5) Gonaporus, Ashm., g. nov.
(Type Pompilus gracilis, Klug.)

Front wings with only one cubital cell; hind margin of the pronotum arcuate.....(6) Aporinus, Ashm., g. nov.
(Kohls gr. 17.)

NEW COCCIDÆ FROM THE ARGENTINE REPUBLIC AND PARAGUAY.

BY T. D. A. COCKERELL, E. LAS VEGAS, N. M.

The Coccidæ herein described were collected by Professor L. Bruner in 1897 and 1898. I examined the collection with more than ordinary interest, as practically nothing was known of the Coccidæ of the Argentine or Paraguay. The flora of the southern part of South America resembles in many respects that of the arid region of North America, and it was therefore not wholly unexpected that this resemblance should extend to the Coccidæ. The collection is too small to show how far such a resemblance may extend, but the species of *Orthezia* and *Lichtensia*, at least, are entirely representative of North American types.

(1.) *Orthezia ultima*, n. sp.— ♀. Waxy lamellæ in two dorsal series, with a deep median sulcus, and the usual lateral series; the dark surface of the back is narrowly exposed between the dorsal and lateral series; anterior lamellæ of the dorsal series thick, prolonged over the head, but *not greatly produced nor divergent*; posterior lateral lamellæ narrow and

about equal in length, *not adherent to the ovisac.* Dried ♀ very dark brown, about 1100 μ long and 1200 broad. Ovisac 3 mm. long, fluted above.

Skin densely beset with small spines. Antennæ and legs very dark brown; lighter and redder after boiling. Antennæ 8-jointed, last joint flat on one side, convex on the other, tipped with a spine. Joints measuring in μ: (1.) 60, (2.) 60, (3.) 84, (4.) 45, (5.) 48, (6.) 60, (7.) 57, (8.) 102.

Hab.—Locality uncertain, but probably Ceres, Argentine Republic. On some herbaceous plant (probably Compositæ) with linear leaves. Allied to *O. nigrocincta* from New Mexico.

(2.) *Asterolecanium viridulum*, n. sp.—♀. Scale circular, 2 mm. diameter, yellowish green, with hardly any fringe; ♀ boiled in caustic potash turns madder red; margin with two rows of figure-of-eight glands, those of either row 12–18 μ apart, and one row of simple glands, the latter not different from the scattered glands of the skin. Mouth-parts large, about 120 μ diameter; labium very short, twice as broad as long.

Hab.—Tucuman, July 26, 1897, "on a kind of ironweed." It is close to *A. pustulans*, and, like it, lives on the stems of the plant, producing cavities. It is a larger scale than *pustulans*, and has not the distinct fringe of that insect.

(3.) *Akermes Bruneri*, n. g., n. sp.—♀. Long. 5½, lat. 6½, alt. 5½ mm.; shape and colour, *Kermes*-like; globular, shiny, smooth, broader than long, very pale ochreous, faintly marbled with a darker tint, and sparsely dotted with raised black points, which are perforated in the centre; two sulci extend upwards from the anal region in the form of a **V**, and other sulci occur somewhat irregularly; some individuals have a dusky reticulation. Inferior aperture, long and narrow (long. 5, lat. 1½ mm.), broadly margined with piceous.

♀. Boiled in caustic potash turns the liquid a dark yellowish brown; skin with a microscopical polygonal reticulation, after the manner of *Eulecanium;* no legs or antennæ found; in the adult the anal plates are wholly obscured, the anal region being occupied by a large, very thick, dark red-brown chitinous mass, having a coarsely radiate structure; in half-grown specimens the usual two plates are easily seen. The skin presents a number of large round dark chitinous areas, such as Signoret figures for *A. verrucosus.*

Larva of ordinary form, with a row of large figure-of-eight (double) glands on each segment; numerous smaller round glands; no spines except the marginal ones, one on each segment on each side, about 15 μ long; no greatly produced caudal tubercles; caudal bristles two, moderately long; anal ring with six long bristles. Antennæ 5-jointed, joint 5 with very long bristles. Joints measuring in μ: (1.) 21, (2.) 15, (3.) 42, (4.) 30, (5.) 42.

Hab.—San Bernardino, Paraguay, Sept. 23, 1897, on spiny plant, probably leguminous.

The genus *Akermes* is closely related to *Lecanium*, but is distinguished by its globular form, round chitinous areas in the skin, microscopical tessellation, and the characters of the larva as described. It has some resemblance to *Cryptes* from Australia, but it is not likely that it has the peculiar male scale of that genus.

One other species is known, *Akermes verrucosus (Lecanium verrucosum*, Signoret), which I had erroneously referred to *Saissetia*. This is from Montevideo, and is very much larger than *A. Bruneri*.

(4.) *Lichtensia simillima*, n. sp.—♀. Red-brown, with a narrow white margin, varying to ochreous; ovisac white, firm, texture leathery; ♀ with ovisac about 5½ mm. long, 2½ high.

♀. Margin with strong simple spines, about 25 μ long and 30 apart; skin with many tubular glands; labium small and semicircular (as in *L. viburni)*; anal plates triangular, about 180 μ long, outer sides about equal, upper surface with a long finger-like process passing from near the middle backwards and inwards, the two processes nearly meeting in the middle line.

Middle leg: femur and trochanter about 270 μ, tibia 180, tarsus 120; tarsal digitules filiform, 60 long; claw digitules slender, about 24 long. Antennæ 8-jointed, with sometimes a "false joint" in the third; joints measuring in μ: (1.) ?, (2.) 45–48, (3.) 96–105, (4.) 33–39, (5.) 48-51, (6.) 36, (7.) 33, (8.) 51.

Hab.—On some shrubby plant. The label reads, "Scale, General Acha." Closely related to *L. lycii* from New Mexico.

Ceroplastes. (Wax Scales.)

The female insects are to be separated by the following tables:—

(a.) External Characters.

Wax of the different individuals confluent, wholly surrounding the branch ..... *Bruneri.*

Wax not thus surrounding branch ..... 1.
1. Waxy scale small, adults less than 5 mm. long, light yellowish...*scutigera*.
Waxy scale larger, over 5 mm. long ..... 2.
2. Wax light amber, two lines of white secretion down each side..*Mendozæ*.
Wax creamy white, no line of white secretion down each side ..... *Bernardensis*.

(b.) Microscopical Characters.

Strongly chitinous, with well-defined patches of perforations..*Bruneri*.
Less chitinous, without such patches ..... 1.
1. Small species, under 3 mm. long, with a large, very well defined chitinous caudal patch..... *scutigera*.
Larger, with the chitinous caudal area gradually shading into the surrounding areas ..... 2.
2. Antennæ 7-jointed, about 190 μ long ..... *Mendozæ*.
Antennæ 8-jointed, about 240 μ long ..... *Bernardensis*.

(5.) *Ceroplastes Bruneri*, n. sp. (T. D. A. & W. P. Ckll.).

♀. Wax cream-colour, surrounding twigs, the whole mass 15 mm. diam., the twig being 7 mm.; dorsal nuclei shining white, sunken in deep depressions; close behind each is a small aperture through which the caudal horn is seen; the waxy mass is conspicuously flecked with snow-white secretion.

♀. Dark red-brown, dorsally almost black, basally lighter and redder; subpyriform, with a truncate base; alt. 5⅓, long. 4, lat. 5 mm., breadth of base 2½ mm.; dorsum shiny; caudal horn short, placed at top of posterior slope and directed upwards. The horn is placed higher up than in *C. candela*. The insects are not separated by wax, but their adjacent sides show much chalk-white secretion, in vertical bands. Skin (dorsal and lateral surfaces) strongly chitinous throughout, orange-ferruginous by transmitted light, anal region a rich dark chestnut; large oval areas (the largest about 240 μ long) full of perforations; at and near the margins the skin is strongly tuberculate, and perforate; antennæ and legs ordinary. Legs measuring in μ: femur + trochanter, about 135; tibia 105 (with a rather long hair 27 μ from the end); tarsus 75; claw 33, slender, nearly straight, with a slight denticle within near the base; tarsal digitules 45 μ long, rather stout.

Hab.—San Bernardino, Paraguay, Sept. 23, 1897. Close to *C. confluens* and *C. utilis*, but especially to the S. African *C. candela*.

(6.) *Ceroplastes scutigera*, n. sp.— ♀. Waxy scale about 4⅓ mm. long, 3 broad, and 2 high; pale ochreous, with a lateral patch of white secretion, but no distinct lines; wax not divided into plates; area around central nucleus not darkened. ♀ denuded of wax, about 2 mm. long, flattish, margin tuberculate, caudal horn short. Skin semitransparent, except anal area, which is occupied by a very large and conspicuous red-brown chitinous patch, which has perfectly-defined margins, and a transverse diameter of about 900 μ; this patch shows a few scattered perforations, and just above the anal plates are a large number of furrows radiating from small perforations; anal plates with their long outer inferior slope strongly convex; margin with very numerous short stout spines; antennæ very pale, only about 300 μ long, 7-jointed, joints measuring: (1.) 30, (2.) 45, (3.) 60, (4.) 75, (5.) 27, (6.) 24, (7.) 33. Femur + trochanter, 177; tibia, 123; tarsus, 70 μ.

Hab.—Ceres, Argentine Republic, June 30, 1897, on a shrub with small entire oval-lanceolate leaves. This may be compared with: (a.) *C. minutus*, which is closely allied, and has the same well-defined caudal patch; but it also has two chitinous patches on each side, containing perforations, these being quite absent in *scutigera*. (b.) *C. speciosus* has the caudal patch just as in *scutigera*, and lacks the lateral patches of *minutus*; it has spines only near the stigmata (for a distance of about 210 μ on each side), whereas *scutigera* has them all around; the antennæ of *speciosus* are very short, only about 165 μ long; externally, *speciosus* is easily distinguished from *scutigera* by its dark reddish wax, with a large whitish dorsal patch. (c.) *C. rotundus* is smaller, with well-defined waxy plates. (d.) *C. purpureus* is much smaller. (e.) *C. Iheringi* looks just like *scutigera* externally, but it has not the caudal patch. (f.) *C. formosus* has bright yellow wax.

(7.) *Ceroplastes novaesi mendozæ*, n. subsp.—Waxy scale about 6½ mm. long, 6 broad, 5 high; pale amber, with a decided ferruginous tint; sides with two white lines more or less defined; wax not divided into plates, strongly nodulose.

♀. Denuded of wax lively ferruginous, convex, about 5 mm. long, 4 broad, 3½ high; dorsum rounded, without prominences: caudal horn short, *directed upwards*, from hind margin to tip of caudal horn is about 2½ mm. Skin not very strongly chitinized, except around anal area; diameter of mouth-parts about 135 μ; antennæ about 180–195 μ long, joints measuring: (1.) 24, (2.) 33, (3.) 24, (4.) 36, (5.) 18, (6.) 20, (7.) 25;

the suture between 3 and 4 is not very distinct. Legs with femur + trochanter 90; tibia 51; tarsus 50, or rather more.

Hab.—Mendoza, Argentine Republic, Jan. 26, 1898, on pithy stems of some herbaceous plant. This agrees with Hempel's *C. novæsi* in the small legs, with the tibia and tarsus about equal; it also agrees externally, except that the wax of *novæsi* is paler and not so red. It seems best to regard the two as geographical races of one species.

(8.) *Ceroplastes Bernardensis*, n. sp.—Waxy scale about 6½ mm. long, 6 broad, and 5½ high, creamy white, not divided into plates nor marked with white lines; dorsal nucleus white, with no dark area surrounding it. Denuded ♀ lively ferruginous, blackish dorsally; length 4⅔, breadth 3, height 2½ mm.; dorsum with a longitudinal crest; caudal horn short but large, *directed backwards.*

Anal area with a ferruginous chitinous patch, the edges of which are not well defined; anal plates shaped as in *C. scutigera*; skin with scattered minute perforations; mouth-parts small, about 130 μ diameter.

Femur + trochanter, 135 μ; tibia 100; tarsus 66.

Antennæ about 240 μ long, 8-jointed; joints measuring: (1.) ?, (2.) 42, (3.) 33, (4.) 33, (5.) 39, (6.) 18, (7.) 18, (8.) 30.

Hab.—San Bernardino, Paraguay, Sept. 23, 1897. On twigs of undetermined plant. This agrees externally with the species which Hempel regards as *C. Janeirensis*, but the structure appears to be different. I cannot reconcile Hempel's *Janeirensis* with Signoret's account of that species, and believe it is wrongly identified. The South American species of *Ceroplastes* are so numerous that it is next to impossible to identify them by such descriptions as were given by the older authors: fortunately, these descriptions are few, and the great majority are well described by Mr. Hempel.

C. Amazonicus resembles *Bernardensis*, but on close inspection it is seen that the wax is divided into plates, though the sutures are colourless.

A CANADIAN ANOPLONYX.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

Among Hymenoptera which I sent to Provancher in 1885 was a sawfly which he determined as *Nematus malacus*, Nort. As it did not correspond to the description of that species, it was set aside with some undetermined material. While rearranging my Nematidæ, I recently examined the insect to ascertain its generic position, and found that

it had simple claws. As it has not the appearance of Gymnonychus, I was somewhat puzzled until, on examining the wings, I found that the lanceolate cell was widely contracted as in the subfamily *Cladinæ*, instead of petiolate as in the Nematinæ. The insect, therefore, must be placed in the genus Anoplonyx, which Marlatt has separated from Camponiscus, which has bifid claws. As no representatives of these genera were known to Marlatt when he published his Revision of the Nematinæ (Technical Series No. 3 ; Dept. Agric., U. S., 1896), the following description of this Canadian form is submitted :

Anoplonyx Canadensis, n. sp.—Length, 5 mm. Rather slender ; black, impunctate ; frontal area distinct, but not strongly marked; clypeus emarginate ; antennæ slender, piceous, finely pubescent, joints three to five subequal ; edge of clypeus, labrum, mandibles, tegulæ and legs, except coxæ, pale honey-yellow ; veins of wings pale, especially the costa and stigma ; four submarginal cells, the second receiving both recurrent nervures.

One ♀ collected at Ottawa about 1885.

CHANGES IN THE COLOUR OF BUTTERFLIES.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

While studying the specializations of the wing in the *Papilionides*, the general results of which are published in the Proc. Am. Philosophical Society, Jan., 1899, I found that *Iphiclides*, *Ajax*, *Marcellus*, etc., differed so strongly from the type of *Turnus* as to be generically separable. *Ajax* is, in fact, allied to species having a greenish or yellowish white ground colour, from South America and the Old World, while *Turnus* is evidently related to the black North American forms, *Troilus*, etc., with which it flies. This fact enables me to draw the probable conclusion that *Glaucus* represents the original colour of the species, which, so to speak, is turning into *Turnus*. The black ♀ *Glaucus* is the more conservative, whereas the males are already, with very rare exceptions, of the yellow type of *Turnus*. It is different with certain cases of so-called "melanism," now spreading in Europe, as *Eubyja* var. *Doubledayaria*, and *Aglia* vars. *fere-nigra* and *melaina*. Here the original ground colour is changing to black indifferently in both sexes.

Conversely it is the male *Callosamia promethea* which appears to have more recently become black, while the female retains what was probably the original red-brown colour of the species. I have alluded to this probability in my paper on the Saturnians, Mitt. aus d. Roemer Museum, June, 1896, p. 14. When compared with *C. angulifera* in this respect, *C. promethea* seemed to me to be the younger, more modern form, in which sexual dimorphism has more recently taken place.

THE YELLOW-WINGED CATOCALÆ.

BY G. H. FRENCH, CARBONDALE, ILL.

At the time of writing the paper on the red-winged Catocalæ* I thought I should very soon complete the list; but other matters have too long crowded out the work I had planned to do. I shall now give, however, my idea of how they should be arranged, with some notes on some of the species. The numbering is continuous with the numbering of the red-winged species:

62. Nebulosa, Edw.
63. Piatrix, Grote.
64. Dionyza, Hy. Edw.
65. Neogama, A.-S.
    var. Communis, Grote.
    var. Snowiana, Grote.
66. Subnata, Grote.
67. Cerogama, Guenée.
    var. Bunkeri, Grote.
68. Paleogama, Guenée.
    var. Annida, Fager.
    var. Phalanga, Grote.
69. Consors, A.-S.
70. Muliercula, Guenée.
    var. Peramans, Hulst.
71. Delilah, Strecker.
    Adoptiva, Grote.
72. Desdemona, Hy. Edw.
73. Calphurnia, Hy. Edw.
74. Andromache, Hy. Edw.
75. Frederici, Grote.
76. Illecta, Walker.
    Magdalena, Strecker.
77. Serena, Edw.
78. Amestris, Strecker.
    Anna, Grote.
    var. Westcottii, Grote.
79. Antinympha, Hubner.
80. Badia, G.-R.
81. Coelebs, Grote.
    var. Phoebe, Hy. Edw.
82. Habilis, Grote.
    var. Basalis, Grote.
83. Clintonii, Grote.
    var. Helene, Pilate.
84. Abbreviatella, Grote.
85. Whitneyi, Dodge.
86. Nuptialis, Walker.
    Myrrha, Strecker.
87. Polygama, Guenée.
    Blandula, Hulst.
    var. Cratægi, Saunders.
    var. Mira, Grote.
88. Pretiosa, Lintner.
89. Amasia, A.-S.
    Sancta, Hulst.
    var. Virens, French.
90. Cordelia, Hy. Edw.
91. Chelidonia, Grote.
92. Similis, Edw.
    Formula, Grote.
    var. Aholah, Strecker.
    var. Isabella, Hy. Edw.
93. Fratercula, G.-R.
    var. Atarah, Strecker.
    var. Jaquenetta, Hy. Edw.

*CAN. ENT., XXXIII., 205 (July, 1901).

var. Ouwah, Poling.
var. Timandra, Hy. Edw.
var. Hero, Hy. Edw.
var. Gisela, Meyer.
94. Olivia, Hy. Edw.
95. Præclara, G.-R.
96. Dulciola, Grote.
97. Grynea, Cramer.
var. Constans, Hulst.
98. Alabamæ, Grote.
99. Titania, Dodge.
100. Gracilis, Edw.
var. Sordida, Grote.
101. Minuta, Edw.
var. Parvula, Edw.
var. Mellitula, Hulst.
102. Amica, Hubner.
Androphila, Guenée.
var. Lineella, Grote.
var. Nerissa, Hy. Edw.
103. Jair, Strecker.

I have examined a number of specimens of *Dionyza*, Hy. Edw., from Arizona, through the kindness of Mr. Poling, and see no reason for calling it a variety of *Piatrix*, Grote. The wings are constantly lighter and somewhat differently marked, and it is a smaller insect.

Desdemona, Hy. Edw., is quite a distinct form from *Delilah*, Strecker. While the mesial band of hind wings shows that it belongs to the same group, the general aspect and markings of the fore wings are quite different. The Eastern form *Delilah* has the general tone of the fore wings a distinct brown, while the Western form is gray, with lighter hind wings. All the Eastern forms I have seen agree with Dr. Strecker's figures, plate 11.

I do not know Henry Edwards's species *Calphurnia* and *Andromache*, except in the descriptions. As to *Badia* and *Coelebs*, there is quite a difference of opinion. From all the examples I have seen, I should regard them as distinct. Mr. C. M. Dodge, of Louisiana, Mo., says that, on the authority of his collectors, they fly at different times. I have seen no intergrades, and will leave them as distinct till breeding settles the question.

Abbreviatella and *Whitneyi* are very close, but from all the examples that have come to me, they seem distinct. They fly at different times, and *Abbreviatella* is the more northern form. I would suggest that Mr. Dodge should make an effort to breed *Whitneyi*, which occurs in his locality, and thus settle the question.

It seems to me that there is little excuse for the name *Blandula*. Our specimens of *Polygama* agree as well with Guenée's figure and description as we can expect of any of the figures and descriptions of the period in which they were made. With regard to *Cratægi* and *Mira*,

they seem to me to be varieties of *Polygama*. None of the forms occur here, but many times I have been called upon to identify them, which I have done with hesitation. Last summer a lot of bred specimens were sent me which contained all three of the forms, but the larvæ seemed to the one who bred them to be identical. Of course, this is not as conclusive as breeding from one brood of eggs, but from this and other observations I should place them together.

I append here three figures, one of *Amasia*, A.-S. (Fig. 1), as it flies in our woods in July. The second is a copy of Abbott's figure of *Amasia* (Fig. 2). The third is a figure of *Cordelia*, Hy. Edw. (Fig. 3), as it also occurs here in the same month. As to the latter, my first examples were identified by Henry Edwards soon after he described the species, so that I have no hesitation in thinking that I know his species. I have taken both forms for a number of years and have never found any variation of

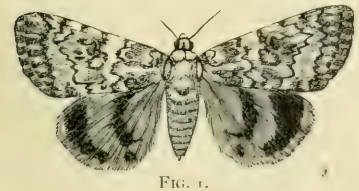

Fig. 1.

Fig. 2.

Fig. 3.

one towards the other. *Amasia* is rather a variable species, the variations consisting in some being lighter than others, and in some showing a greenish tinge as in var. *Virens*. On the other hand, *Cordelia* varies but little. As to which one Abbott had before him when he made the figure, I think no one who sees these figures will doubt. I have shown these figures to several who are well versed in the genus, and without hesitation they said *Amasia* as I have it here and not *Cordelia*. Dr. Strecker's figure 12, plate 9, is a very good copy of either Abbott's figure or of a specimen of *Amasia*.

I have many times had *Alabamæ* from the South for identification, and I can see no reason for regarding it as a variety of *Grynea*. The

colour of the fore wings is always lighter and of a greenish tinge, and there is less brown in the markings.

Mr. Dodge's addition to the list, *Titania*, is a good species. So is, also, Dr. Strecker's addition, *Jair*. I have seen examples of both of these.

Before closing this I want to speak again of the *Junctura* group. The more I see of the Arizona specimens, the more satisfied I am that the Texan form is separate from both of those that occur in Arizona. There are two forms there: one that is even reddish gray, that should be known as *Babayaga*, Strecker; the other one is a more broken light and dark reddish gray, and this is *Arizonæ*, Grote. The Texan form is a larger insect than either of the Arizona forms, of an even greenish gray, and may be known as *Texanæ*.

THE DECTICINEAN GENUS EREMOPEDES.

BY A. N. CAUDELL, WASHINGTON, D. C.

The genus Eremopedes was established by Scudder in 1894, CAN. ENT., XXVI., p. 178, 181. It was founded on a female specimen in the National Museum, but the species was not described till 1900. Previous to that date Mr. Cockerell described a species from New Mexico, together with a colour variety of the same, and I can now add a third species to the genus. In connection with its description it may be well to give a short account of the genus, which may be characterized as follows:

Insects of medium size. Head with the fastigium moderately prominent. Thorax with the prosternum unarmed.* Pronotum smooth, moderately rounded, nearly as much arched posteriorly as anteriorly, and without carinæ. Legs moderately spinose, hind pair long, the femora extending far beyond the tip of the abdomen, usually as much as half their length. Fore tibiæ spined above on the outer margin only, the spines three in number. Ovipositor moderately curved upwards.

The species, so far as now known, occur in the south-western part of the United States, from Colorado southwards, and all appear to be comparatively rare. The species may be separated as follows:

A. Lateral lobes of the prothorax well developed, the posterior border distinctly sinuate. (Fig. 4b.)

a. Larger. Unicolorous, a uniform pale brown..... *unicolor*, Scudd.

aa. Smaller. Variegated, dark above, paler below.. *Balli*, n. sp.

* There are two small blunt spines present, but they are not conspicuous.

AA. Lateral lobes of the prothorax somewhat feebly developed, the posterior border without a sinus. (Fig. 4a.)

a. Colour brownish ochreous marked with black ..... *Scudderi*, Cock.

aa. Uniformly apple green in colour .. *Scudderi*, var. *viridis*, Cock.

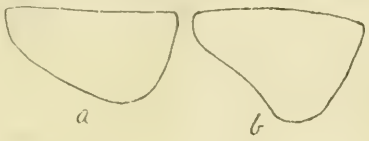

Fig 4.

EREMOPEDES UNICOLOR, *Scudd.*

Eremopedes unicolor, Scudd., Cat. Orth. U. S., 78, 97–98, pl. 2, fig. 1 (1900); Index N. A. Orth., 110 (1901).

The author's description is here given :

"Nearly uniform dull brownish testaceous, the hind femora feebly infuscated apically. Head full, the face somewhat ferruginous and the genæ with fuscous blotches, the fastigium rather prominent, rounded; antennæ very slender, about half as long again as the body, testaceous. Pronotum well rounded, equally arched in front and behind, without lateral or median carinæ, the front margin feebly convex, the hind border truncate, but laterally rounded; lateral lobes obliquely deflexed, well rounded beneath, the oblique posterior margin with a distinct though slight sinus. Tegmina aborted. Legs rather long and slender, the fore tibiæ with three spines above on outer margin. Ovipositor more than two-thirds as long as the hind femora, distinctly arcuate, moderately slender, faintly tapering, apically acuminate, castaneous, the apical margins darker.

"Length of body, 25 mm.; pronotum, 8 mm.; fore femora, 7 mm.; hind femora, 21 mm.; ovipositor, 16.5 mm.

"One female. Arizona, U. S. National Museum." (Type No. 5736.)

It is pointed out by the describer that this, being the species on which the genus was established, is the type of the genus, even though another species, *E. Scudderi*, Cock., had been previously described. This view may be questioned according to the latest published laws on this subject, and the genus previous to the publication of Cockerell's species in 1898 was certainly invalid, being based on an undescribed species. However, the circumstances seem to justify the retention of *unicolor* as the type of *Eremopedes*, Scudd.

EREMOPEDES BALLI, n. sp.

Very similar in form to *E. unicolor*, but readily distinguished from that species by the average smaller size and varied coloration. It is also a slightly less robust species.

General colour brownish above, much lighter below. Head moderately full, dark brown above, face and lower part of the genæ pale, the upper portion of the genæ generally much mottled with fuscous. Mandibles rufous distally, with piceous teeth, the overlying labrum pallid. The fastigium as in *unicolor*. Eyes black, small, rounded, slightly longer than broad. Thorax shaped as in *unicolor*, very dark above and pallid below, the lateral lobes ample and with pale yellowish margins, broadest on the posterior margin ; this pale emargination is continued narrowly across the anterior edge of the pronotum above, but on the posterior edge it gives way above, and towards the upper part of the lateral lobes to a narrow piceous emargination. Abdomen dark above, but usually distinctly lighter than the pronotum and pallid beneath. Legs light brown, paler beneath, the posterior femora black at apex, armed beneath on inner side with from 1–3 short spines, usually 1 ; fore and middle femora with a small genicular spine, often very indistinct or absent on the anterior ones. All the tibiæ spined both above and below, the spines concolorous with the tibiæ, and usually, especially those on the upper side of the posterior pair, apically infuscated. Wings invisible in the female, in the males the tympanum is visible, a fourth as long as the pronotum, very dark brown, with veins and margins pallid. Ovipositor gently arcuate, castaneous, apically infuscated.

Length of body : male 19–24 mm., female 20–25 mm. ; pronotum, male 5.5 mm., female 6–6.5 mm. ; hind femora, male 15.5–17 mm., female 18.5–21 mm. ; ovipositor, 13–15 mm.

Six males, three females, Ft. Collins, Colorado. (Type No. 6150, U. S. Nat. Mus.)

These specimens were collected on August 10th, 1901, on a stony hill a mile or so west of Ft. Collins. They were very active in eluding pursuit, and their colour harmonized so well with the surrounding grass and stones that they were with difficulty captured. They mature early in August and seem to be quite local in their distribution. I was guided to their haunts by Mr. E. D. Ball, to whom I take pleasure in dedicating the species.

EREMOPEDES SCUDDERI, *Cock.*

Eremopedes Scudderi, Cock., Ann. Mag. Nat. Hist. (7), II., 323–324 (1898); Scudd., Cat. Orth. U. S., 78 (1900); Index N. A. Orth., 109 (1901).

The original description is here given in full:

"Length of body 19–21 mm., of pronotum 6 mm., hind femora 21.33 mm., hind tibiæ 23 mm., ovipositor 19.20 mm., antennæ about 51 mm.

"Sepia brown in effect, but in reality ochreous, closely and finely marked with blackish; the density of the black marking somewhat variable, but the lateral margins of the pronotum always broadly pale ochreous. Pronotum truncate in front and behind, the margins narrowly castaneous and slightly concave; lateral lobes not greatly developed. Ovipositor dark brown, only moderately curved. Hind femora with 5–7 very short spines on the inner side; hind tibiæ with from 28 to 33 spines in the outer row. Spines of the anterior tibiæ pale ochreous, tipped with black and having a black longitudinal line on the upper side; there is also sometimes a black patch immediately at the base of each spine. Spines of hind tibiæ brown tipped with black, but the ridge from which they spring is whitish.

"Var., *viridis*. Similar to the type, but entirely bright apple-green.

"*Hab.*—Mesilla Park, New Mexico, on the campus of the New Mexico Agricultural College. Eight of the brown form and two of the green. They were found in an outhouse, and are doubtless nocturnal in their habits. One specimen was found in the jaws of a *Scolopendra heros*, which had killed it."

The National Museum collection contains one male specimen of this species from Mesilla Park, N. M., a topotype probably sent by Prof. Cockerell. The pronotum of this specimen is dark ferruginous above, and the posterior femora are but 19 mm. in length. The pronotum is also slightly flattened posteriorly above, probably due to shrinkage in drying.

I desire to acknowledge the kind consideration of an unknown friend, in sending to me 38 *Cecropia* cocoons, apparently all sound. The package bore the postmark of Chicago.

J. ALSTON MOFFAT, Cur. and Libr., Ent. Soc., Ont.

Erratum.—Page 67, third line, for *Hammaniella* read *Harrimaniella*.

LABELS.

Anyone who has had even the slightest experience in attempting to get intelligent notes to accompany his acquisitions by exchange has doubtless been sorely vexed—to put it no more strongly. Anyone who has tried to keep a careful record of the conditions under which his own collections were made has also doubtless felt the need of some better scheme than the regulation notebook. It is for these reasons that I suggest an idea which I find very useful.

In the first place, I write (or print with a hand stamp) my own locality labels so that I can fix the places definitely. The ordinary entomologist, unless he has a large collection from precisely the same *limited* locality, can scarcely afford to have special labels printed, and general ones are useless when the collection is to be used for more than a purely æsthetic exhibition. "Chicago, Ill." tells almost nothing of value for Chicago, if only the region within city limits is meant; it is a big place and any attempt to find a second specimen must necessarily be made as much in the dark as the first.

But the real plan which I wish to present is one by which full notes of the insect's environment are kept upon the same pin with the insect, and its ecology can thus be taken in with the same glance that sees the mounted specimen.

Botanical ecologists have divided plant habitats into hydrophytic, mesophytic, and xerophytic. The same classification can be applied to animals, and we would term those insects living in moist situations "hydrozoic." "Xerozoic" follows naturally for the dry habitats; but when we come to "mesozoic" we have an interesting preëmption by the geologists. Nevertheless, whatever the names used, the habitat types remain, and I have chosen to represent them in the following manner:

Across the top of the locality label a solid (———) blue line indicates that the specimen was found in water—the most extreme hydrozoic situation imaginable. A line of blue dashes (– – – –) means that the insect was taken in a swamp; while blue dots (. . . . . .) signify a swale. Green is used for medium conditions—a solid green line standing for dense woods; green dashes for open woods; and green dots for thickets. A solid red line represents the driest sort of places—a desert or dry rocks; red dashes, grass land, prairie, etc.; and red dots, the boundary between grass land and forest.

This may seem to be a very cumbersome plan, but I feel confident that a little use will convince even the most skeptical that it is not. My labels are cut from sheets of thin Bristol-board which have previously been ruled as indicated above—the lines being spaced according to the size of the labels desired. This ruling may be done with a pen and different coloured inks, or any printer will do it quite cheaply. The cutting is done so that the lines come at the top of the finished label, and a supply of each kind of these is kept in separate compartments in my label box. It is then as easy a matter to pick out the right sort of slip upon which to write the locality as it is to use a plain white label which means nothing.

One beauty of the plan is that it is capable of almost indefinite expansion, and so can never be outgrown. An addition which I have found useful is to have a supply of very small bits of paper, or preferably light Bristol-board. These are of various colours and shapes. If the specimen be of a night-flying species, I put a square black bit on the pin just above the locality label. If it be active only at twilight, I use a narrow black bit. If it was found in the ground, a square brown bit in the same place shows that ; while a narrow brown piece indicates that it was found under a board, stone, or some such thing. A minute green square tells at a glance that the insect lived in a tree ; a green oblong stands for a log ; and a roughly circular green bit signifies a stump habitat. A yellow square indicates a carrion insect ; while a yellow oblong is put upon the pin of one found in manure. And so we can run through the whole gamut of insect environment, although, I think, these will be found to cover most of the ground, providing we add a symbiosis label. This may conveniently be a white one, small as possible, upon which is written the name of the other symbiont ; e. g. "golden-rod," "dog," or "Formica *sp.*"

We have, by this means, always with the insect, not only the date and locality of its capture, but compact notes of its habitat and general environment. Your notebook is always open and never lost. A case of insects becomes, in fact, a notebook illustrated by specimens. It is then something more than mere "dried bugs," interesting as they may be. Furthermore, a supply of such labels taken into the field is an exceedingly easy and accurate method of making field notes, as the appropriate ones can readily be slipped into the paper or box with the insect.

FRANK E. LUTZ, Chicago, Ill.

NOTE ON CTENUCHA CRESSONANA.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

In the Catalogue of the Lep. Phalænæ, p. 528, this species is incorrectly referred to *C. venosa*. The specimens there recorded are probably all *C. venosa*, at least those from my collections are. Mr. Geo. Francke sends me two fresh specimens of *C. Cressonana*. In these, as stated in my original description, Proc. Ent. Soc., Phil., June, 1863, the third stripe of *C. venosa* is wanting. The stripes on cubitus and branches and along anal region of primaries may vary from white (as I described them) to yellow, and the costa may be yellow (in the first instance) or red. For the yellow-striped form with red costa I propose the name var. *lutea*. The fringes in *C. Cressonana* are entirely white, and I was careful to point out other differences from *C. venosa*, which should not have been overlooked by the author of the Catalogue above referred to.

ON THE USE OF EUPETHECIA.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

In reference to a recent "protest" in the pages of the CAN. ENT. (Vol. XXXIII., p. 263) against a change in the generic name *Eupethecia*, I believe its abandonment, in favor of a Hübnerian name chosen out of the Verzeichniss by Mr. Meyrick, to be invalid. I retain it myself in the collection here for the reason that its date is certain, and there is a rule of the German zoological code that if exact dates cannot be ascertained (and this is the case for that part of the Verzeichniss which contains the Geometrids), preference shall be given to the genus which has a type cited. This is reasonable, and custom has correctly sanctioned the use of *Eupethecia*. I am indebted to Mr. L. B. Prout, of London, England, for the information that Curtis himself, in founding the genus *Eupethecia*, explicitly chooses *absinthiata*, L., as type of the genus, April 1, 1825. In my study of the Geometrid genera (1895-96), only a fragment of which appeared in the Transactions of the Entomological Society of London, I pointed out some of the errors into which I have reason to believe Mr. Meyrick has fallen. I express here no opinion as to the use of *Phalæna* as a generic title, but, if used, I believe its restriction by Fabricius in Gen. Ins. Mant., 1777, would give *prosopiaria*, L., as type. The European *papilionaria* is the type of *Terpne*, Hübner, 1806. I have not found the type of *Geometra*. I believe we must keep *Eupethecia* for the "pugs."

DESCRIPTION OF A NEW NOCTUID.

BY HARRISON G. DYAR, WASHINGTON, D. C.

Aleptina inca, n. gen., et sp.

Two males, Arizona (Cox); So. Ariz., Apr. 1–15 (Poling).

Fore wings gray, cinereous shaded at base, followed by a large ochreous patch that extends to the t.-a. line on lower half of wing. T.-a. line upright, germinate, black, twice waved; orbicular large, oval, whitish, black ringed and containing a large, oval, brown-black centre; reniform similar, but obscure and lost in a pale shade that extends to costa at t.-p. line. T.-p. line black, parallel to external margin cut off above by the white shade, followed closely outwardly by a blackish subterminal line. A crenulated, pale, blackish edged terminal line. Fringe pale, dark spotted. Hind wings whitish, a dusky shading before the fringe. Abdomen gray; thorax concolorous with fore wings. Expanse 23 mm.

Two females, Comfort, Texas (Holland); Kerrville, Tex. (Barnes).

Similar to the male, but paler, more ashen gray, the markings less contrasted; hind wings largely shaded with brownish gray except on the base and on the fringe. Expanse 23 mm.

Antennæ filiform; front moderately produced, with a wide platelike projection above, nearly as wide as the space between the eyes, a similar, but curved and less prominent plate below on the lower edge of the front. Palpi upcurved, reaching above the middle of the front, uniform, scaled, the third joint slightly narrowed at base. Tongue distinct. Fore femora stout, tibiæ short, unarmed; tarsi spined; hind tibiæ with the spurs long. Thoracic vestiture of broad flat scales; abdomen untufted. Vein 5 of hind wings distinct, arising from lower part of cell. Wings shaped much as in *Baileya*, Grote (*Leptina*, Guen., nec Meig.), but narrower.

BOOK NOTICES.

GENERA INSECTORUM.—Published by P. Wytsman, 108 Boulevard du Nord, Brussels, Belgium.

The first part of this important work has been received and amply fulfills any expectations that one may have formed regarding its style and appearance. It is of quarto size, beautifully printed, with broad margins to the leaves, and an admirably-executed plate in black and white. The family Gyrinidæ (Coleoptera) is treated by Dr. Regimbart, who gives a general description of the characteristics of the family and a synoptic

table of genera ; this is followed by descriptions of each genus and a list of the species belonging to it, with their geographical distribution. On the plate a specimen of each genus is depicted, with beautifully clear figures of structural details.

The original plan of publication has been somewhat modified and the work will now be issued in smaller parts, each containing a single family of insects. The price will vary in accordance with the number of pages and plates contained in the part, at the rate of 1 franc 60 per plate and 20c. per page. The first part, consisting of 12 pages and 1 plate, will thus cost 4 francs = 80 cents. The language adopted for the work is French. It is to be hoped that the number of subscribers will be sufficient to enable the enterprising publisher to complete the work without loss ; he certainly cannot have any anticipations of profit.

Fumigation Methods.—By Willis G. Johnson, New York: Orange Judd Company, 52 Lafayette Place. One Vol., pp. 313. (Price, post-paid, $1.00.)

The writer of this handy volume is well-known amongst economic entomologists as the Apostle of Hydrocyanic Acid Gas, the virtues of which as an effective insecticide he has never lost any opportunity of extolling. He has now brought together in concise form the results of his own methods as well as the experiences of others, and furnishes a most convenient manual of information for fruit-growers, florists, nurserymen and others who may be compelled to resort to this drastic means of exterminating noxious insects. The material used for fumigation is of such a deadly poisonous nature that it cannot be recommended for general use and should only be adopted by experienced persons who understand the necessary precautions and will see that they are carefully carried out. The study of this book will give all necessary information regarding the practical application of the gas, the apparatus required and the appliances that have been found most satisfactory, and it should be in the hands of everyone who has anything to do with fumigation. Besides the gas referred to, an account is given of the use of Carbon Bisulphide, which—with simple precautions—may be employed by anyone for the destruction of household pests, underground vermin, mill or granary insects. The book is fully illustrated and written in a clear and concise manner.

Mailed April 5th, 1902.

HYDRŒCIA (BIRD)

BAPTISLE (MALE)
LIMPIDA
CATAPHRACTA
DUOVATA
INQUAESITA

BAPTISLE (FEMALE)
CERUSSATA
IMPECUNIOSA
NECOPINA
INSULIDENS

The Canadian Entomologist.

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NEW HISTORIES AND SPECIES IN HYDRŒCIA.

BY HENRY BIRD, RYE, N. Y.

(Continued from Vol. XXXIII., p. 68.)

In searching out the boring larvæ of the Noctuid genus *Hydræcia*, that large and showy species, *speciosissima*, has continued to prove a decided enigma. This great tawny fellow, with its distinctive white spots, must in the early stages leave some flagrant evidence of its whereabouts behind, yet try as we may all efforts seem in vain, and the conclusion was finally reached that Rye could not number this species in its local list. So the few records of its capture are looked up, and the determination is made to have a trial elsewhere. In 1868, Grote and Robinson described this species, together with *inquæsita*, under the generic term *Gortyna* (Trans. Am. Ent. Soc. I., 342), and relate receiving their types from Seekonk, Rhode Island. Knowing the tenacity with which a colony clings to a favourite resort, a couple of days in July, 1900, were taken for a flying trip to that place; the writer believing that should conditions yet remain favourable, the desiderata might still be found. Not being down on ordinary maps, it was inferred Seekonk might be some rural hamlet, perchance having the good fortune to remain unchanged all these years. But this ancient township, so strongly associated with Puritan days and Roger William episodes, has now merged into a suburb of the progressive city of Providence, and our hopes sank as we sped in electric cars through its byways. But hold! On passing some shady nooks, do we see aright? Yes, there is that brown, withered fern leaf—*inquæsita* is here sure enough. It cannot deceive us now, and soon there are plenty more in sight. At any rate, here is one of Mr. Grote's friends, but then *inquæsita* has a rather ubiquitous food-plant, and may be expected anywhere, while *speciosissima* is an unknown quantity entirely.

The following day the hunt is on in full vigour, but, search as we may, borers are scarce, in no way approaching the numbers of our home haunts.

Besides the fern borer, *marginidens* and a stray *cataphracta* are all that appear, and, disconsolate, it is feared our trip has been taken in vain. The flora is but slightly different from that of Rye, and those plants favourable for boring which are new to us are so few as to be easily examined, but all give negative results. One of the number is such a nice, smooth-skinned, stocky perennial, that it seems it should be infested by something, if only a common *nitela*. So it is hardly a surprise when in another locality, that has apparently run to waste for years, this plant is found containing young *Hydræcia* at work in the stem. Not seeming familiar, though at such an early stage one cannot be very positive, a score or more are sought, and together with a supply of the food-plant are transported to the home menagerie. In due season a series of the imago is at hand, and, strangely, it proves a species that will fit in nowhere. So, though missing *speciosissima*, an unexpected result is scored in another direction, and the Rhode Island venture is voted a success after all. The succeeding year another lot of the larvæ are secured, that our earlier conclusions may be fully verified the second time, with a result to only strengthen the former impressions.

Upon encountering new forms in a genus already well represented, and where these exhibit affinities closely connecting the representative species, the questions of varietal limitation at once become important. Perhaps the greatest help in such cases is a knowledge of larval developments, the wider the better, or the experience gained in viewing large series of the imagoes as they emerge into the perfect state. So it will happen in an extended study of *Hydræcia* that certain delineations of specific characters become more or less easy and offer lines by which we may reasonably expect to differentiate them. More especially may this hold when recognizable differences occur in the early stages as well, so that it appears just how much one known valid species is separated from its ally. With the importance now properly given to larval structure, and especially that of tubercle arrangement as an aid in classification, the theories arising as to the development, use and significance of these characters are of more than passing interest. Furthermore, when considering them as a means of graduating genera to our conceptions of what may be "higher" or "lower" in point of specialization or descent, positive notes as to the acquisition of these characters carry importance. Thus, when meeting a *Hydræcia* larva which nicely illustrated a point in this line, there was naturally a desire to draw attention to it. Yet, try as we may,

there seems no proper place to assign the species, and after careful consideration, aided from several sources in forming a more correct conception of the earlier described types in the British Museum, it appears incumbent to advance a new name. This is our apology for entering the domain of the describer, as our idea in this matter had been that such offices are only properly filled by the specialists in their respective branches.

Hydræcia baptisiæ, sp. nov.

Imago expands 35 to 38 mm.; the general characters and habitus fully typical to the *marginidens* section of the genus. Antennæ simple, both sexes, with a white scale at the base. The thoracic vestiture is ample, shaded with tints of primaries; the collar has a yellowish edging above, and is centrally prolonged into an adze-shaped tuft. The abdomen is also tufted with a series of small crests, which diminish posteriorly, and are lost on the fourth segment. The primaries show a trifle narrower in their proportions than some of the allies, with a tendency to acuteness at the apex. Colours are an admixture of red-brown overlaying a yellow ground, the outer portion affected but slightly by the usual purple shading. At extreme base a white scale; basal half-line irregular, "3" shaped, encloses an area well defined, and, in all cases noted, yellow. T. a. line indistinct except at inner margin, where it shows plainly geminate. It forms the outer boundary to a portion that is tinted with the purple shade of the outer spaces. T. p. line of the usual irregular course, bending outward past the reniform with a fairly true ogee curve; is geminate, having the inner line red-brown, the outer purplish. The median field thus enclosed is red-brown, the lower portion showing the yellow undercolouring more conspicuously. Median shade lines faintly discernible, a wavy shade from the lower part of reniform to inner margin. S. t. line very erratic, incurved between the veins; the subterminal area is an unbroken band from costa to inner margin, fairly parallel. Its colour is the same throughout, a reddish-purple. (Purple being the effect of mixing red and blue, the resultant tint may tend to one or the other of the primary colours in proportion to which predominates in the mixture. Hence, reddish-purple implies largely of red and little of blue. It is important to designate accurately the tone of the subterminal area, as it takes on a varying shade of purple in most of the species. With *purpurifascia* it shows very nearly a royal purple, while in *cataphracta* it becomes at times almost a simple blue.) The terminal space reverts to the tone of

the median field; a patch or shade near the apex is distinctly yellow. The ordinary spots are very white and contrasting, not unusually large, however; the reniform is broken centrally by the conventional lunulate line, and where the outer portions are divided by the veins the upper section is, in some instances, stained with yellow. The secondaries are pale yellowish, inclined to silkiness, the discal marking evident from above; veins and fringes a trifle darker, the latter beautifully silky when fresh. A wide, indistinct cloud along the outer margin. Beneath glistening, yellowish, clouded with rosy scales. The male genitalic characters show no departure from the usual type. Date of flight, Aug. 28 to Sept. 10. Types are in the British Museum, the National Museum at Washington (No. 6149), and in the collection of the author.

It is presumed the larvæ hibernate in their first stage. In the middle of June an entrance is made in the food plant, *Baptisia tinctoria*, and the rest of its existence is passed concealed within its burrow. This plant, being indigenous, may well be considered the preferred or original one. The entrance is made well up in the stem, or sometimes in a branch, and the gallery continued downward. The lower stem and root are so very tough that progress here is slow, and the burrow rarely gets far below ground. Plants do not show the effect of this mining to any marked degree, so that in searching out the specimens one has to rely on those little tricks gained alone by experience, and amounting to a certain phase of woodcraft, if gratifying results are to be secured.

The pupa is sometimes formed in the burrow, though the more robust and active examples which mature earliest invariably leave the plant and change in the neighbouring soil. The young larva in the third stage from maturity bears out fully the conventional appearance of the group to which it belongs. The first four abdominal segments show as a dark purple-brown band or girdle, while the others are longitudinally striped with the usual whitish lines. A very faint trace of the dorsal extends over these four joints, which is a feature to be noted when making comparisons. In the succeeding stage the length becomes 28 mm., the proportions still very slender and cylindrical. Head normal, of a shining honey yellow in hue, and shows a dark line at the side which takes in the ocelli. Plates and tubercles are all strongly defined; special mention may be made of the anal leg-plates as being largest on this pair.

On the seventh abdominal segment tubercle IV., bearing a well-developed seta, is low down below the line of the spiracles, as is customary with Noctuid larvæ. On the preceding joints it is a little above the

spiracles, also a normal position. But at this point of larval existence a rather striking point of so-called specialization occurs, and this happens with a few other species also, which, though a trifling matter apparently, serves to differentiate it at once and forever from its near ally, *marginidens*. At the close of the stage a faint trace of a corneous plate appears on joint seven, in the exact position where IV. is on the preceding ones.

With the cast of skin that brings the larvæ into the penultimate stage, it is found there is a large, well-developed tubercle here on abdominal joint seven in the same position and of similar outline to IV. on the preceding joints. It has not been that IV. has been raised to its corresponding position on the others, for it is still occupying its previous normal position lower down, and we have to do clearly with an acquired character, which we may designate as IVa. The larva attains to a length of about 34 mm. in this stage.

Mature larva: The colour now becomes a soiled translucence, without traces of the usual lines. While the head and shield have increased, the plates situated at the true tubercles or elsewhere do not show a corresponding enlargement. The plate IVa is as large as the true IV., though both are of slightly less size than IV. on the preceding joints. This feature has been constant in a large series of examples, and is the principal feature of a structural nature by which it may be differentiated from its ally. There exists a very perceptible difference in size, colour and general appearance in their immature stages, obvious enough to one familiar with these borers, but it seems sufficient to separate our species in this matter of the acquired plate alone, as by it we can distinguish the larvæ of such dissimilar species as *inquæsita* and *necopina*, *nitela* and *limpida*. Considering the development of this additional plate IVa as pointing to a higher specialization, and that those species possessing it represent a more recent evolution from the earlier type, permits us to look with some degree of assurance for this older form in such widely diffused species as *immanis* of our fauna, and *micacea* of Europe, whose common parentage seems unquestioned, and whose larvæ, at least the latter, have the normal Noctuid arrangement on the seventh abdominal segment. Continuing in this line, we might expect in the ornamentation of the imago the more rigid, straighter transverse posterior line as a primitive marking and a tendency with our later, specialized species as having the orbicular, claviform and reniform white-marked and contrasting—a feature not common to the Noctuids as a whole. Stress has been

laid on these features not only to point out their scope specifically, but to show that the later developed species, constituting the numerous clusters of the *rutila* and *marginidens* groups, have not yet had time to establish themselves very fixedly, nor to acquire striking individualities, and that the slight disparities now existing are in the main not surprising. It is not hard to find parallels elsewhere—*Datana* may offer an example—and doubtless the knowledge of larval development in many Noctuid genera will bring other instances to the surface. *Baptisiæ* larvæ reach maturity the first week in August, becoming from 40 to 44 mm. in length, and change at once to shining brown pupæ, which are typical with their allies and transparent enough that the white stigmatal spots of the primaries can be discerned through the shell directly before emergence. According to the tabular arrangement of the imagoes in the recent Revision, it would find a position in section twenty-four next to *marginidens*, Gn. Had the larva remained unknown there might have been some hesitation in separating it from the latter, as variation, especially in size, produces some forms that come rather close to *baptisiæ*. Guenée's type is a good-sized example, truly typical (this is more than can be said of the type of *appassionata*, which is a slightly deformed specimen), showing the dentate fringes which frequently become noticeable in the larger examples. Our species differs in the colour of the basal spots, the size of the reniform and tint of ground colour, though the discrepancies are in no case great. In another direction *baptisiæ* simulates *circumlucens*, whose larva is unknown, but as a co-type rests in the writer's collection, and the other types have been examined, a position of certainty is assumed here. *Appassionata* is too unique in ornamentation to be confused, and *furcata*, as yet a very rare species, can in no way be confounded with the Providence species. To *rutila* there will be reference later.

Some examples of an undescribed *Hydræcia* from the Pacific coast have been referred to the writer for description in this article. It seems probable others may ultimately come to light from this source, since by the universal habit of keeping close we often miss meeting species in flight that become comparatively common when sought in their earlier stages.

Hydræcia insulidens, sp. nov.

The ornamentation is typical of the *rutila* series; ground colour, a light chrome yellow, presumably quite bright in newly-emerged specimens. The powdering of darker scales, common with others of the allied species, is not so marked in this case, though the veins, in being defined

by dull purple-brown scales, serve to tone down any striking colour effect.

Expanse 32 to 37 mm.; head and palpi of usual proportions, front smooth, antennæ simple; the thorax is clothed heavily, the usual tufts prominent in good specimens. At extreme base of primary a yellowish or whitish scale, variable as is so often the case in its degree of contrast; basal line "3" shaped, and extends half way across, enclosing an area that may be whitish or more deeply stained with the tint of the ground colour. T. a. line not strongly marked, irregular in its course, best defined as it passes the claviform. The portion it bounds is decidedly purplish. The median field is strongly yellow, of a hue not copied by any eastern species here allied. Toward the costa purple shadings appear, developing into a noticeable shade or bar, which connects the orbicular and lower half of the reniform. The ordinary white spots are much stained with the yellow of ground colour, and are probably never a very pure white. They are of usual size and pattern, but not as a rule very contrasting. The median shade line shows more of a departure than any other marking. In lighter specimens it is best traceable; beginning at the inner margin, it bends outward, then starts across the wing at nearly a right angle with costa. The point of difference lies in the angle being lower than usual, and at the same time less acute. T. p. line geminate, well defined, bending outward opposite the reniform it produces a strong curve to the point of beginning on costal margin, which is directly above this spot. S. t. space entirely purplish, its line is irregular and inwardly dentate between the veins. The apical patch is yellow; in lighter specimens the whole terminal space reverts to this colour.

The secondaries are more smoky in hue, with a faint deepening of colour at the outer margin; veins traceable; fringes incline to purplish. It is easy to imagine a vague, rosy flush existing in examples when just emerged, making them a rather pretty species. Under side is glistening, somewhat rosy, and shows the usual blending of darker scales.

The genitalic characters exhibit no strong individuality. Three examples, all from Vancouver Island, embracing both sexes, stand as types; one in the Rutgers College collection, one with Mr. W. D. Kearfoot, a third with the writer. Other examples in indifferent condition have been seen, usually seeking shelter under the *rutila* label. The species seems a western representative of the white-spotted series that run so close in the east, but locally has no near relative. Its position in the

synoptic table would be in section twenty-three. While the larva is unknown, it is safe to presume that the pupa is not formed in the burrow. There can be no confusion with *Ochria sauzalitæ*, which appears farther southward in California, for though the latter has the ordinary spots white, it is of a different build, and possesses a structural difference whereby generic standing is attained.

Still another species allied to the foregoing may as well be here treated, since it will in no way lessen confusion in keeping the present status of this species as it now is. The rather wide scope of variation attributed to one of the Guenée species has proved too extended, with two forms at least receiving recognition under the term *rutila*. A suspicion of this was reached when better material came to hand, and the breeding of the larvæ side by side has dispelled any questions whatever. While the present reference may be lacking in fullness of the entire subject, the incongruity of considering too fully distinct species under one name, now that their position is realized, can no longer be excused. When Guenée described an American species under the name *rutila*, in 1852, so few others are known that he seeks the European *Ochria flavago* with which to compare. To one high in authority the following translation of his description is due, and since it might be unavailable to some who would care to give the matter attention, is here copied :

" Expanse 35 mil. Fore wings entire, of the same yellow as *flavago*, with the same bands and lines of the same colour. Reniform white, divided into several parts by the ground colour. Orbicular and claviform rounded, of a bright white, and between them a small white spot. Hind wings like *flavago*, but with washings effaced, abdomen whitish ; base of antennæ white. Illinois, coll. Boisd. and Doubleday. It is perhaps the species which Duponchel says is so near *flavago*, in the supplement." The type, perhaps by this time not in the best of condition, rests in the British Museum. While there may be little to be gathered from this description on account of the number of American forms so closely related, yet its repeated comparisons with the European *flavago* are of assistance. That the local species we would differentiate from *rutila* has little to closely connect it with the exotic *flavago* is certain, and Guenée's type, as might be expected, is a much lighter insect. Occasion is now taken to expressly record the fact that our species, furthermore, is absolutely distinct from that figured by Mr. Moffat as *rutila*, Can. Ent., Vol. XXXIII., pl. 2.* This latter occurs commonly to

*This plate was kindly furnished by Mr. Dwight Brainerd, of Montreal.—Ed. C. E.

the Montreal collectors, who are also familiar with its larva. To them belongs the pleasure of a fuller treatment of the species, its life-history and habit. So it is the intention to proceed only with the species common to the Atlantic seaboard in this latitude, and of which notes on its early history were given by the writer, CAN. ENT., XXXII., 276.

Hydræcia duovata, sp. nov.

Expanse 34 to 38 mm. Antennæ simple, head smooth in front. Wings rather narrow; primaries acute: ground colour dull yellowish or tawny, powdered with dark rusty scales; when fresh a sheen as of dull brass is noticeable in those portions not affected by the dull purple shadings. The ornamentation and markings similar to the species previously described. Basal spots of the ground colour. T. A. line irregular, angulated or saw-toothed till it passes the claviform, when it is strongly outcurved. Inside this line a dull purple area, which is not highly contrasting. T. p. line geminate with the customary outward curve over the cell. Median field is dull yellow, and evinces most notably the darker powderings. The shade line is confused until making the angle, from which point it pursues a straight, oblique course to the inner margin. S. t. space evenly defined in dull purple, and the terminal space, except for the yellow apical dash, is scarcely of a lighter shade. The fringes are the same shade of purple. The ordinary spots are white, the reniform rather small, and stained with yellow in its upper outward portion. The orbicular has usually a dark scale at the centre, and is disconnected by the merest thread from the claviform, which is made up of two ovai parts.

Secondaries are dark for this section of the genus. It is the tone here and of the body vestiture which appeals strongly in separating the species. In any species the depth of powderings on the primaries often produces a phase of variation, but the tone of the under wings and abdomen do not alter. One appreciates this with the extended series to be had by breeding, and its force becomes influencing. The male genitalia are typical. Imagoes fly in September, never appearing until *nitela* has been in evidence for some time. Types are in National Museum and collection of writer. This occasion is taken to request correspondents to change all *rutila* labels sent out from Rye to *duovata*, as this species alone has been dispensed under the Guenée label.

To Mr. Wm. Schaus we are indebted for a comparison of the species with the type of *rutila* in the British Museum. A good series in this,

as well as a number of allied species, were sent to him, so that a full appreciation of their exact relationship could be obtained, and his conclusions under the circumstances may be considered authoritative. In the unsolicited opinion that *duovata* differed from the type, the departures are skillfully noted, and his comparisons and verifications of the other species whose types were before him in the Museum collection, leave no room to say the matter was treated without weight or with carelessness. Should subsequent developments cause adverse opinions to arise, however, we would beg for the retention of our name in a varietal sense as designating this narrow-winged form peculiar to the salt-water Golden-rod, and whose early history had only been wrought out after years of diligent searching. Its larva is so easily recognizable—indeed this and *cataphracta* form a section by themselves on larval characters—that it seems improper to have its individuality subject to any confusion. On being confronted by the evidence which may be procured throughout the various stages by breeding these insects, it is believed any who may feel alarm at this increase of our list, or fear the subject has fallen into the hands of an extremist, will find relief upon making individual studies in the genus. The plate accompanying this article is an innovation perhaps, in that it may be the first time Noctuids have been depicted by this process. While there is much yet to be desired in controlling the colour scheme, and the purple iridescence of the subterminal space has been lost entirely, the individuality of each specimen is beyond cavil, and we do not need to make an allowance for high colouring, since the pictures in no way flatter the insects.

H. baptisiæ, Bird, shows in the two figures the ordinary sexual disparity. *H. limpida*, Gn., has not been previously figured, and is sufficiently typical. *H. cerussata*, Grt., also typical, is compared with its close ally that the differences may be noted. *H. cataphracta*, Grt., was introduced for comparative value. *H. impecuniosa*, Grt., is at times confused with the former when in imperfect condition, and is shown for the first time. The specimen is larger than ordinary. *H. duovata*, Bird, gives a fair idea of the species, and, as variation is not great, should be a means for easy determinations. *H. necopina*, Grt., had not been figured before, and at this time may be of interest. *H. inquæsita*, G. & R., is rather an undersized specimen, but is typical in that the spots are concolorous. The angulated shade line, a distinctive feature, may be noted in the likeness, which is the first to have been caught of this species. *H.*

insulidens, Bird, the only example not bred, shows the insect in a good light, and should be an aid to western collectors.

A few remarks further argumentative to the results of these studies may be pertinent. The extent to which variation proceeds with this genus has long been a subject receiving attention. That affecting the imago is such as to cause little uneasiness, even though extended in a very few cases. When it is a question of size or wing outline we can explain this in a partly mechanical sense. When their larvæ have lived in an especially rank or vigorous plant an excessive subsequent development may be expected, while those larvæ that leave their burrows from one cause or another and suffer from a lack of food until locating in some substitute, produce the undersized or dwarfed specimens so frequently met with. Thus the rank growth of *Ambrosia trifida*, on the Jersey meadows, yields a giant race of *nitela*, whereas the dwarfs so often seen among *marginidens* and *cerussata* are the result of the larvæ leaving their original abode and taking up with some substitute like Burdock. The wing outline is influenced by the quarters occupied by the pupa; when this is formed in a gallery having insufficient room for a normal development, the resultant imago has the primaries narrower and more acute at the apex in proportion to this previous condition. *Impecuniosa* and *duozata* best illustrate this feature. The colours of the imago here as elsewhere are subject to their peculiar vagaries, but it is not found that they are in any way exceptional. Just what produces colour is not definitely known, of course, but it pertains no doubt to a chemical rather than any mechanical process. So the slight disparities at times noted in the same species, as arising from differences in the food-plant, might be explained on this ground, though it does not meet the question properly. Further than citing that colour is most susceptible to change in the depth of powderings, in the hue or even suppression of the ordinary white spots, it may be needless to proceed. We may apply the general biological law to the effect that commoner and more widely distributed species are apt to show a greater variation, and not meet with any incongruities. The common *nitela* best shows the departures ever taken in the colour scheme, but they are positively not due to locality, food-plant, sex, or even the varying conditions that might assail different broods, and the form to which the varietal name applies is merely the extreme in the opposite direction. But varietal studies have not been confined to the imago

alone, the larva also having received close scrutiny. Two cases of variation, alone worthy the name, are all that have been noted. One a colour change due to a certain food-plant; the other, extreme, with a corresponding departure in the moth that makes it easy to fancy, points out the way new species are formed. This departure occurs with *purpurifascia*, and is primarily the result of food-plant and the accompanying conditions. So many captures of this species had come to light from sections where Columbine did not grow, it was evident there must occasionally be some other food-plant. So it was not surprising when the discovery was made, even in this locality, that in Loosestrife, *Lysimachia quadrifolia*, another popular food prevailed. Indeed, in all places thus far examined by far the greater number will be found at work in the latter plant. Yet, strangely, one would hardly associate the robust Columbine feeders with the attenuated examples in Loosestrife, for these at maturity are scarcely half the diameter of the former, though in length they rather exceed them. Their peculiar proportions are due to the very small size of the Loosestrife stems and roots, and the Harris term "spindle worms" as applied to these borers seems now most fitting. The tubercles do not attain the size, or the colours the depth, of the Columbine feeders, yet there is no difference in the position of the former. The resultant moth exhibits a constant disparity, the purple fascia, which is really the outer portion of the t. p. line, is narrowed and much less striking; the general tone is subdued, and with a marked difference of wing outline, produces a form that is at all times unmistakable. Still, it may be wise to differentiate them by no other terms than that of their respective food-plants. Doubtless many of the varietal names of our lists would never have been created had the reason for such occurrences been better understood, or the significance of the departures fully noted.

It may be fitting to conclude with a quotation from an authority who is summarizing on an extended research in the whole biological field: "False facts are highly injurious to the progress of science, for they often endure long; but false views, if supported by some evidence, do little harm, for everyone takes a salutary delight in proving their falseness, and when this is done one path toward error is closed, and the road to truth is often at the same time opened." Let us hope in the present case what are advanced as facts may prove such beyond peradventure; while from the views, thanks to the authority, but slight trouble can ensue in any event.

ECOLOGICAL LABELS.

I have been greatly interested in reading the suggestive article by Mr. Lutz, in your last (April) number, on labels. It voices a need, which every student of ecology will have felt, for more information than accompanies the specimens in the usual collection. No one can collect insects carefully without making observations that are new to science, and it is unfortunate that such observations are generally left unrecorded. Mr. Lutz proposes a plan that would make the observations of the amateur collector available for comparison, and that would wonderfully enhance the value of his cabinet. It is, in short, proposed that the collection shall be its own expositor, that pin labels on the specimens shall tell at a glance what usually, if recorded at all, has to be hunted through the leaves of an accompanying catalogue. Nature's label is, of course, already on every specimen, but we are not yet skillful enough at reading the imprint of environment as written in bodily form and structure, and need to be told in our own language.

But instead of using our common language, Mr. Lutz proposes a system of signs and symbols—blue, green and red lines on labels to indicate hydro-, meso- and xerozoic animals respectively, and bits of coloured paper of various shapes to indicate a few special habitats—and therein, I fear, lies the weakness of his plan. It is arbitrary. His collection without his key would possess no notes at all. I have used coloured papers, but have never happened to hit upon the same meaning for them that he suggests, and I have long since forgotten what some colours once stood for. I frequently see wholly enigmatical bits of coloured paper on the pins of specimens in the collections of other people. Under existing circumstances it would be difficult to bring about that uniformity so absolutely essential even in the use of the few signs suggested.

But a far more serious defect of the plan is that it does not go far enough. The few types of habitat provided for are entirely insufficient for ecological purposes. The collector of aquatic insects would have to begin at once inventing additional signs to indicate anything further than that his insects came out of the water, and the collector of gall insects would find in the system no provision for the important facts he would wish to record. No system of arbitrary signs could conveniently meet the needs of all entomologists, even if it could be trusted not to lead to dire confusion.

Still, I have faith in the general idea Mr. Lutz sets forth. I believe the pins or vials can be made to carry far more ecological information than notebooks usually do carry, and that the usefulness of collections would be greatly enhanced thereby. I have been experimenting with the loading of the pins, and I have come to the conclusion that the English tongue is our safest means of communicating observations, and that printed labels are both feasible and economical. Printers' ink is black and permanent, in air or in alcohol.*

What sort of printed labels are now commonly used? There is but one that has become at all universal, and that is the locality and date label. A collector's name label is not uncommon, nor is a sex sign label. Then there is the red label with "type" printed across the end, well established in some of the more important collections, and I would suggest, if entomologists may act in concert, the restriction of this colour to typical material in the broader sense; the above-mentioned label for types of species, and a red label with the author's name for all material that has served as the basis of his papers. Some Lepidopterists are using "at light" and "at sugar" labels, and I have found almost indispensable "bred" and "taken in transformation" labels. These are all separately useful, and if one be getting printed labels at all, he can get them all, and more, almost as easily as he can get one of them alone, for labels are printed a dozen or more at an impression, and a dozen different forms can be set up as readily as a dozen of one form. Neither does one find his pins becoming encumbered by labels, for rarely are more than two necessary.

What sort of ecological labels may advantageously be added to the foregoing? Probably a different sort in every ecological group. But if they be printed in plain English, it will matter little how many different sorts or whether collectors in the same group use the same sort. So, I will offer a suggestion relative to recording ecological data for aquatic insects, a label that will tell fairly the sort of aquatic home from which the insect comes, consisting of twelve words descriptive of features of habitat, printed in four columns of three words each in pearl type:

bottom	level	mud	reedy
side	sloping	sand	trashy
surface	steep	rock	bare

*I am keeping an ever-increasing proportion of my collection in alcohol. It is the bane of American Neuropterology that systematists have kept, or have tried to keep, their specimens all on pins. There is one thing much worse than a specimen without a label, and that is a label without a specimen, especially if the specimen were a type.

The nature of the habitat is to be indicated by the underscoring of the proper words. By combination of underscores a very satisfactory statement of aquatic conditions can be made.

However, if the locality label were a general one, as "Lake Forest, Ill.," I would suggest also a more general aquatic habitat label to go on the pin, above the one just illustrated, to be marked by underscoring in the same way:

lake marsh river rapids
pond bog creek eddy
pool swale brook spring

In a locality for which a standard detailed map is available, the great exactness in locality records that is required in local ecological work may be attained by indexing the map in the usual way—with letters on one side and numbers on the other, and then adding to the usual general locality label the letter and number from the map, to indicate the exact spot from which the specimen was obtained. But, after all, from the ecological standpoint, the fixing of the exact locality is of much less importance than the exact indication of the sort of habitat in which the specimen is found. JAMES G. NEEDHAM, Lake Forest, Ill.

MORE CONCERNING LABELS.

It was with interest that I read the article by Mr. Frank E. Lutz in the April number of the CANADIAN ENTOMOLOGIST entitled "Labels."

It is not so very many years ago (perhaps thirty) that we were satisfied if specimens sent to us only bore a State label, the State label as first used being nothing more or less than a coloured disk, a different colour for each State. A few years more, and we had the abbreviated State labels — N. J. for New Jersey, Can. for Canada, etc. Not long after, we asked our friends to mark the label in such a manner that we might know from what part of the State the insect came. Then it was that the collector with pen and ink would mark the label in one of the corners, or perhaps make a mark in the centre, thus designating as to what part of the State the insect had come from. This was not a bad plan, and to-day many such labeled specimens can be seen in the "Horn Collection," as well as other collections in New York and Philadelphia. However, we were not yet satisfied, so some fifteen years ago our Washington friends started to have local labels printed with a blank space in which to write the date of capture. A few years more and the collector's name was called for, and this, by many, was also added. Now we have the "Lutz Label" presented to us as a further advancement in the

labeling of our specimens. The question is, however, if it is necessary or of much practical use to label specimens in this manner, as students of entomology who have had any experience in collecting generally know whether a certain species of insect or group of insects is found in a wet or a dry place. He knows but little who would look for Cicindelidæ or the larvæ of any of our Rhopalocera in a mill-pond, or for Dytiscidæ or the larvæ of any of our Odonata in a dry pine woods. However, no one will find fault with the specimens from Mr. Lutz bearing the "Lutz Label," providing the specimens are in good condition and are accompanied with exact locality and date of capture, and if collector's name is given it will do no harm. All collectors of natural-history specimens have a reputation, some better than others — the Ornithologist and the Oologist found this out long ago. There are, no doubt, many insects that it would be wise to mark in the manner Mr. Lutz speaks of, but to label all our captures in this way would be a waste of precious time.

PHILIP LAURENT,
Philadelphia, Penn.

FENARIA SEVORSA AND EUSEMIA SABULOSA.

BY HARRISON G. DYAR, WASHINGTON, D. C.

I was in error in referring these species as synonyms in 1894. The latter now stands as *Tuerta sabulosa*, Boisd., in Hampson's Cat. Lep. Phal., and is credited to New Mexico and California, besides other more southern localities. Very possibly the species may occur within the limits of the United States, but I have no specimens from our territory, all being from Mexico. *Fenaria sevorsa*, Grote, is, however, not the same insect, and the name must be restored from the synonymy. It has been subsequently described and well figured in the Biologia Centrali-Americana as *Diamuna aedessa*, Druce. This position, in the Noctuidæ, is undoubtedly correct, as the antennæ are shortly pectinated, without any trace of enlargement. The genus Diamuna is an Agaristid, and Druce's species is therefore improperly referred to it. The genus Fenaria, Grote, must be substituted for Diamuna, Druce (nec Walker). Dr. Barnes has taken the species in the Huachuca Mts., and Mr. Hubbard in the Chiricahua Mts., Arizona. Dr. Barnes has also from Arizona *Diamuna longipes*, Druce, so that the genus is thus represented in our fauna :

Genus Fenaria, Grote.

sevorsa, Grote.	Ariz., Mex.
aedessa, Druce.	
longipes, Druce.	Ariz., Mex.

NOTES AND DESCRIPTIONS OF PERLIDÆ.

BY NATHAN BANKS, EAST END, VA.

In going through the accessions to my collection, I have found several new species and new localities for some known forms. Most of these are included in this paper.

Perla capitata, Pictet.

P. capitata, Pict.: Hist. Nat. des Neuropt., p. 214, 1841.

P. tristis, Hagen: Syn. Neur., N. Amer., p. 22, 1861.

On comparing specimens of *P. tristis* with Pictet's figure and description, I find that these species are identical, a fact which I had suspected before.

Perla fumosa, n. sp.

Head orange yellow, a large black spot covering the lateral ocelli and extending forward to the clypeus, a brown spot above each eye; basal joint of antennæ dark brown, rest pale yellowish brown; pronotum wholly dark brown; thorax yellow above, with brown spots on mesothorax; abdomen pale yellowish brown; venter yellowish, as is also the under side of the thorax; legs dark brown, but little paler beneath; setæ yellow on base, brown beyond; wings slightly fumose, veins brown. Pronotum very much narrower behind than in front, its sides straight, angles quite sharp. In the male there is a median brown spot on the last ventral segment.

Length, ♂, 16 mm.; ♀, 22 mm.

One pair taken together near Washington, D. C., 11th June, 1899. Readily separated from *P. capitata* by the yellow under side of thorax, etc.

Perlinella sobria, Hagen.

Perla sobria, Hag.: Bull. Geol. Surv. Terr., 1875, p. 577.

One specimen sent by Prof. Cockerell, collected at Las Vegas, New Mexico, June, 1901. It agrees very nicely with Hagen's description, and can be easily recognized by the three pale spots in a row between the eyes.

Perlinella frontalis, n. sp.

Head with a large pale yellowish spot each side above the eye and reaching to the posterior margin, almost touching each other on the median line, which is black; the posterior angles brown; a large blackish spot in the middle of the head, pointed behind, in the middle covering the lateral ocelli, and tapering forward to the clypeus, a yellow spot

each side above base of antenna, and connected to the yellow behind. Pronotum blackish, a small pale spot in middle of each side margin; rest of thorax dark brown; abdomen brown; venter pale brownish, with an elongate black spot on the side of each segment. Legs and setæ pale yellowish brown. Wings hyaline, veins mostly dark brown, some apical ones and some of the transversals yellowish brown. Radial sector two-forked beyond the anastomosis. Pronotum but slightly rugulose, its sides much rounded, as are also the posterior angles.

Length 13 mm.

One specimen, Beulah, New Mexico, May 30 (W. Porter).

Perlinella signata, n. sp.

Head pale yellowish; a blackish spot covering ocelli and extending forward, leaving a yellow mark over base of each antenna; within the dark mark are two median pale yellow spots, one between the ocelli, and another rather smaller in front of the median ocellus; antennæ brown; under side of head yellow. Pronotum brown, the side margin and a broad stripe in the middle yellowish; the ridges marked with black; rest of thorax brown, with a median yellow spot on front margin. Abdomen brown; venter and pectus pale yellow, a brown spot each side in front of second and third coxæ; legs and setæ pale yellow, the knees and tarsi more brown. Pronotum almost twice as broad as long, its sides nearly parallel and straight, angles almost acute. Wings hyaline, rather yellowish, veins brown, those of hind paler; radial sector twice-forked beyond the anastomosis. Ventral lamina entire, its apical margin evenly rounded.

Length 14 mm.

One female from Michigan, without further locality.

Chloroperla 5-punctata, n. sp.

Head pale yellow, the ocelli and lateral callosities black, the latter resembling ocelli; antennæ yellowish, upper side of basal joint brown. Pronotum pale yellow, with a large quadrangular brown spot on each side, leaving a rather broad median pale stripe; rest of thorax and the abdomen pale yellowish, as are also the legs and setæ; wings hyaline, veins pale yellowish brown, the costal ones on basal half pale yellow. Wings rather long and slender, the radial sector twice-forked beyond the anastomosis; pronotum rectangular, angles rather sharp, sides straight and parallel, about one and three-fourths times as broad as long.

Length 10 mm.

One specimen from Las Vegas, N. Mexico, by the Gallinas River,

June 9 (Cockerell); another specimen from Colorado, probably near Fort Collins.

Nemoura venosa, Banks.

I have taken this specimen at Washington, D. C.; the types came from Colden, N. Y.

Nemoura Coloradensis, Banks.

I have recently seen a specimen taken by Prof. Cockerell from top of range between Sapello and Pecos rivers, New Mexico, 11,000 ft., on August 2.

Nemoura pallida, n. sp.

Head, pronotum, thorax and legs pale reddish yellow; ocelli and lateral callosities black; tarsi brownish; basal joint of antennæ yellowish, with brown above, rest of antennæ brownish. Abdomen brown; wings yellowish hyaline, veins yellow-brown. Pronotum about one and two-thirds times as broad as long, as broad behind as in front, its sides slightly convex. Wings long and slender; the cross-vein at end of discal cell, though very oblique, does not reach back to the fork of the median vein; a striking character.

Length 10 mm.

One specimen from Little Beaver, Colorado, July 8.

DESCRIPTION OF A NEW CARNEADES.

BY JOHN B. SMITH, SC. D.

Carneades fusimacula, n. sp.

Resembles *redimicula* in most points, but with the colours of *divergens*. The collar has the broad median black shade of *redimicula*; but the primaries do not have the pale costa. Sub-costal and median veins gray. Ordinary spots outlined in gray, the orbicular oblong, oblique, open inferiorly and fused with the reniform, the outline being continuous. The spots are gray powdered and are preceded by black shadings in the cell. A blackish basal streak, to which is joined a long claviform extending half way across the median space: this is black-margined but concolorous. S. t. line not marked, apex grayish, terminal space else nearly concolorous. In other characters much like *divergens*, with which, also, it agrees in size.

Habitat.—California.

The type is a unique male in the collection of the U. S. National Museum, exact locality not known.

The original description for this species was written prior to 1891, but in some way it seems to have escaped publication. My attention was drawn to the matter in 1893, when the species was cited in the catalogue without a reference, but for some reason the omission was not then made good. To entitle the name to recognition in the forthcoming catalogue, it is hereby formally authenticated by description.

The species should be easily recognizable by its intermediate position between *redimicula* and *versipellis*, and by the fused ordinary spots.

NOTES ON LYCÆNA SCUDDERII, EDW.*

BY HENRY H. LYMAN, M. A., MONTREAL.

Writing of this species in his magnificent work on the Butterflies of New England, Dr. Scudder said :

"This butterfly is double brooded throughout the whole of its range, the first generation making its advent during the last week in May, the females emerging the first week in June, when the males are common. * * * The second brood varies considerably in the time of its apparition. Mr. Saunders reports that the first butterflies appeared one year in London, August 2nd ; while Mr. Lintner took the first at Albany on July 15th, another year found them beginning to fly by the 7th, and one year even found them 'very abundant' on the 9th. * * * The eggs are doubtless generally laid in both July and August, but whether the mature larva or the chrysalis hibernates is unknown. * * The caterpillar has been taken in the field only by Mr. Saunders, who found it upon *Lupinus perennis*, Linn. * * The European species, to which it is closely allied, are reported to feed upon Melilotus, Genista, Hedysarum, Trifolium, Onobrychis and Colutea. Our species feeds with the utmost freedom on Lupinus, * * but it must find other food in the high north. Edwards states that it also feeds on Ceanothus. * * * The history of this butterfly needs to be closely followed after August to determine in what condition the insect passes the winter. If in the egg state, * * where is the egg then laid ?"

The first time I had the pleasure of meeting with this butterfly in life, and only a field naturalist knows the pleasure of first seeing in life a species familiar in the dried state, was on 10th July, 1898, during a day's collecting at High Park, on the western outskirts of Toronto, where I

*Read before the Montreal Branch, 11th Feb., 1902.

found it abundant, and coquetting with the harebells. About 5 o'clock they were settling for the night on the fructifying stems of grass.

On 19th July, 1899, I again visited the same locality, and secured a pair in coitu, which I boxed and took home to Montreal, and on the 23rd put the female in a cage with *Melilotus Alba*, Desv., *Vicia Cracca*, L., and *Phryma Leptostachya*, L., as Lupinus was not available. Before placing her in the cage, she was fed with sweetened water, as she had had nothing since her capture on the 19th, and she fed for three hours. She was fed again twice, but on 30th was found to be dead, and the cage was dismantled and a careful search made for eggs resulted in finding three on the Phryma, one laid on the upper side of a leaf near the edge, one just at the junction of a leaf-stalk with the main stalk, and the third on the same leaf-stalk about ¼ inch from the other.

Scudder described the eggs as being pale green, the tracery of raised network being frost-white upon it, but in my notes they are described as white like porcelain.

The winter was passed in the egg state, the box containing them being kept in a cool cellar. On 28th April I observed that one of the larvæ had chipped the egg, and was trying to get out, but it did not seem able to enlarge the hole sufficiently. About a week later it was still alive, and was seen moving, but did not succeed in getting out. One larva hatched all right, but the third egg showed no sign of life. I did not, however, succeed in getting the one larva to feed.

On 15th May I paid another visit to High Park to look for larvæ, and succeeded in finding about ten, some of which I sent to Dr. Fletcher. They were in different stages, some nearly mature. Some were found on the Lupines, and a few in curled-up dead leaves of trees lying under the plants. The ants were running about the plants, which I knew indicated the probable presence of these larvæ, though at first I found them difficult to find.

These wild larvæ had evidently hatched a good deal earlier than mine, but that is easily understood, as the locality where they were found is a bank sloping towards the south, the soil being very sandy, and receiving the full effect of the sun's rays, I was simply baked lying on the ground to search for the larvæ, so that any snow that fell would melt early in the spring, and vegetation would start early, while our season in Montreal would be probably a week or ten days later.

In my experience, the larvæ eat holes in the leaf, sometimes away from the edge, and sometimes at the edge, though I occasionally noticed a leaf where the parenchyma had been eaten out and the membrane left, as described by Scudder.

As I had found one or two larvæ within curled-up dead leaves, I thought they might seek such a retreat for pupation, and so kept one in the breeding jar, and three out of the four that I carried to imago pupated inside the leaf provided, and the fourth on the lid of the jar. The first one pupated on 20th May, the second on 21st, the third not noted, and the fourth on 26th. On 1st June the first two were dark coloured, and both emerged on 2nd June, the first in the morning and the second in the afternoon. The third emerged on 4th or 5th, and the fourth either in the evening of the 5th or morning of the 6th. The pupal period varied, therefore, between 11 and 13 days.

Now, in regard to food-plant, I am positive that even if the second brood ever feeds on Ceanothus (which I think most unlikely), the first brood cannot, for the simple reason that it does not leaf out early enough. There are several clusters of *Ceanothus Americanus*, L., the New Jersey Tea, the flowers of which, by the way, are very attractive to Theclas, growing within a couple of hundred yards of where I found the larvæ of *Scudderii* on Lupine, but on 15th May, when these larvæ were nearly mature, the buds of the Ceanothus showed no signs of even swelling, so if this butterfly exists north of the region of Lupine, we must look for some other food-plant than Ceanothus.

Postscript.—I wrote to Dr. Scudder about the question of food-plant, but he was unable to give me any information, and then wrote to Mr. Edwards, and received a reply as follows :

"Coalburgh, W. Va., 17th Feby., 1902.

"Dear Sir,—

"I have no recollection as to the Ceanothus. * * * I think S. has made a mistake in referring to me.

"Yours truly,

"W. H. Edwards."

Since reading my paper, I have received a copy of the note on "Scudder's Blue" by Mr. J. B. Williams, reprinted from "The Ottawa Naturalist" of January, in which he records finding, on 7th Dec. last, two eggs on the withered leaf-stalk and seed-pod of Lupine.

THE FORMATION OF GENERIC NAMES.

An article in the April number of the CANADIAN ENTOMOLOGIST leads me to offer a few remarks on this subject. The custom of forming new generic names by attaching a prefix or suffix to the existing name of a related genus has grown to serious proportions in recent years. There are several reasons why it should be discountenanced. For one thing, it almost invariably makes the name too long to look or sound well. This is no trifling disadvantage, although some entomologists seem not to appreciate the fact.

A second objection is that these names are usually lacking in euphony, as a result of the grafting process, having a tendency to break in two at the point of junction when they are spoken.

A third is that the relation indicated by the name may not really exist when the group comes to be more fully studied, or when different characters are made the basis of classification; or, an entomologist may simply make a mistake in assuming a relationship, which cannot be corrected after the generic name is once published. For instance, Eugnoriste is as far removed in relationship from Gnoriste as it could be and remain in the same family.

Still another objection lies in the danger that the name used as a foundation may turn out in the course of time, by the application of we know not what rules of nomenclature, to be invalid, or to apply to some other group, thus leaving the later name either meaningless or misleading. In Mr. Ashmead's article, which called forth my observations, this is a glaring objection to his procedure, as he states in the article that the genus Pompilus is preoccupied. Hence, his new names will in future suggest a relationship to the Mollusca or Pisces, rather than the Hymenoptera!

Such combinations as I object to would be all but impossible in the present generation, as they have been in the past, had we but the same æsthetic perception of euphony, and the same classical training, as the fathers of entomology. I might add to this, had we the same sense of responsibility when we establish a new genus.

I am aware that occasional instances on the best authority can be found that are open to one or another of my objections. I am also aware that I once made a genus that I called Gnamptopsilopus, which is open to all my objections but the third; but I have reformed since then.

J. M. ALDRICH, Moscow, Idaho.

BOOK NOTICE.

JACOBSON, G. G., AND BIANCHI, V. L. Orthoptera and Pseudoneuroptera of the Russian Empire and adjacent countries. After Dr. K. Tümpel's "Die Geradflügler Mittel-Europas," Part I., pp. 1–80, tab. I.–V. St. Petersburg, 1902. Ed. by A. Devrient, 4to. (in Russian). Price, complete work, about $7.

The authors of this work have for their object to collect all possible information concerning the fauna of the superorders of Orthoptera and Pseudoneuroptera in the above-named geographical limits, and to give the keys for identification of all species inhabiting this extensive area, comprising almost all Europe (except south-west) and the north of Asia to the Himalayas and Central China.

The first part of the work, just published, contains introduction, keys to the nine orders, an almost exhaustive bibliography of the subject (over 921 Nos. concerning the Orthoptera genuina alone), and an account of the order Dermatoptera—"earwigs." The latter is accompanied also with a bibliographical list (166 Nos.) and the keys to the genera and all the species inhabiting the above-mentioned countries. The account of the geographical distribution over the vast Asiatic portion of Russia is of great interest, being quite new and elucidating some important facts in this respect. The synonymy, very surprising in certain cases, is based on the strong laws of priority.

Taking into consideration the great faunic affinity of both the North American and Eurasian continents, we must acknowledge this work, when continued and completed with the same skill and accuracy, will be very useful to every investigator of these insects in North America. The Russian language will not offer any great inconvenience to the serious student of these orders.

NICHOLAS KUSNEZOW,
St. Petersburg.

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CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

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(Paper No. 5.—Continued from Vol. XXXIV., p. 88.)

SUBFAMILY IV.—Planicepinæ.

This subfamily comes nearest to the *Aporinæ*, and a few of the males are easily confused with and mistaken for some males in the latter group.

The head is, however, lenticular, very thin antero-posteriorly, the temples being very flat, while the antennæ are always placed much closer to the mouth, *on* or *below* an imaginary line drawn from the base of the eyes. These characters ought to enable the student to recognize readily a wasp falling in this group.

Some males in the subfamily *Aporinæ* have a lenticular head, but in these the antennæ are inserted *above* this imaginary line, never on or below it.

Two tribes may be recognized.

Table of Tribes.

1. Apterous.....3.
   Winged.
   Front wings with *three* cubital cells.....2.
   Front wings with *two* cubital cells.
   Clypeus short, not much produced; front legs in ♀ greatly swollen, with tarsal joints 2–4 short, transverse or nearly, in ♂ normal.....Tribe I., Planicepini.
2. Clypeus much produced, flat or at most only slightly convex, projecting over the mandibles; front legs in ♀ usually normal, more rarely much swollen.....Tribe II., Homonotini.

3. Clypeus flat, much produced anteriorly, covering the mandibles; front femora swollen.....Tribe II., Homonotini (pars).

Tribe I.—Planicepini.

Nothing seems to be known positively of the habits of any species belonging to this group.

I hope, therefore, that some of our students will endeavour during the present summer to ascertain the life-history of one or more of our species.

Table of Genera.

1. Second cubital cell longer than wide (or high).....2.
Second cubital cell wider (or higher) than long.....3.
2. Second cubital cell receiving *both* recurrent nervures.....Planiceps, Latreille.
(Type Pompilus planiceps, Latr.)
Second cubital cell receiving only *one* recurrent nervure—the first, the second joining the cubitus *beyond* the second transverse cubitus; pronotum with the hind margin arcuately emarginate; submedian cell in front wings longer than the median, in hind wings shorter.....Melanaporus, Ashm., g. nov.
(Type Planiceps euferatis, Fox)
3. First and second cubital cells each receiving a recurrent nervure.....Hoploneurion, Kohl.
(Type H. apagona, Kohl.)

Tribe II.—Homonotini.

In this tribe the front wings have *three* distinct cubital cells, while the clypeus is flat or, at most, sub-convex, and produced anteriorly so as to cover the mandibles.

A single wingless genus is known, *Apteropompilus*, Brauns, recently discovered in Africa. It has the structural characters of other genera placed here, except in being without wings. I have not had a specimen for examination, but structurally it seems to come very close to *Pedinaspis*, Kohl, and I suspect it may ultimately prove to be a wingless species belonging to that genus.

Meracus, Tournier, judging alone from the description, is evidently synonymous with *Pedinaspis*, Kohl.

Table of Genera.

1. Winged.....2.
Wingless.

Mesonotum very long; front femora rather long and swollen, the tibia stout; claws with one tooth beneath.....Apteropompilus, Brauns.
(Type A. tosquineti, Brauns.)

2. Wings normal, when closed extending beyond the tip of the abdomen.....6.
Wings more or less abbreviated, when closed *not* extending beyond the tip of the abdomen, especially in the females, in ♂ usually of normal length.....3.

3. Mesosternum emarginate at the middle; second and third cubital cells very unequal, the third much the larger; cubitus in hind wings originating *beyond* the transverse median nervure; claws with a tooth near the middle beneath.....5.
Mesosternum not emarginate at the middle; second and third cubital cells large, nearly equal; claws with a strong tooth at middle beneath.....4.

4. Transverse median nervure in front wings interstitial with the basal nervure; cubitus in hind wings variable, usually originating *beyond* the transverse median; clypeus separated at base by a delicate sutural line; body not entirely black.....Parapompilus, Smith.
= Micropteryx, Lepel.
(Type Pompilus brevipennis, Fabr.)
Transverse median nervure in front wings *not* distinctly interstitial, the submedian cell a little longer than the median; cubitus in hind wings originating *beyond* the transverse median nervure; clypeus very flat, polished and not separated at base by a delicate sutural line; body entirely black or blue-black.....Pedinaspis, Kohl (pars.).

5. Eyes bare; hind tibiæ *not* spinous, pubescent, and not or scarcely longer than the tibiæ; transverse median nervure in front wings interstitial with the basal nervure.....Epipompilus, Kohl.
(Type Ferreola azteca, Cress.)
= E. Maximiliani, Kohl.
Eyes pubescent; hind tibiæ unarmed; front femora rather stout, the tarsal joints 2–4 short, not longer than thick. (♂ unknown.) (Peru.).....Aulocostethus, Ashm., g. nov.
(Type A. bifasciatus, Ashm., MS.)

6. Metathorax posteriorly obliquely truncate, impressed, the angles more or less acute.....7.

Metathorax flat, feebly rounded behind; scape as long as the first joint of the flagellum; clypeus rounded.. ....Ceropalioides, Radoszk
(Type C. Komarousii, Radoszk.)

7 Scape cylindrical, neither subcompressed nor longer than the pedicel. and first joint of the flagellum united; clypeus flat, clothed with a silvery pubescence; pronotum not longer than the mesonotum...8.

Scape subcompressed, longer than the pedicel and first joint of the flagellum united; clypeus very flat, not separated at base by a delicate line; pronotum distinctly longer than the mesonotum.

Submedian cell in front wings a little longer than the median, the second and third cubital cells subequal, the cubitus in the hind wings originating *beyond* the transverse median nervure.....Pedinaspis, Kohl.
(Type Pompilus operculatus, Kirby.)

8. Metathorax a little longer than wide, semicircularly impressed or emarginate posteriorly, but *without* a median impressed longitudinal line, the hind angles more or less acute; second cubital cell usually a little longer than the third or subequal; first joint of flagellum in ♀ as long as the second, in ♂ shorter. .....Wesmaelinus, Costa.
(Type Sphex sanguinolentus, Fabr.)

Metathorax not longer than wide, impressed posteriorly, but also with a distinct median longitudinal impressed line; body clothed with a silvery pubescence; second cubital cell smaller than the third; first joint of flagellum in ♂ as long as the second.. Homonotus, Dahlbom.
(Type H. fusciventris, Dahlb.)

Subfamily V.—Notocyphinæ.

This subfamily is quite distinct from all others, and is easily recognized by the characters made use of in my table of subfamilies, the large free labrum being found in no other group except the *Ceropalinæ*; but from that group it is distinguished by the long pronotum, the curved, not straight, antennæ, and by the non-emarginate eyes. The antennæ are inserted some distance above the clypeus.

The habits of the group are unknown. I suspect, however, that, like the *Ceropalinæ*, the species are either parasitic or inquilinous in the nests of other wasps, the *Pepsinæ* and the *Aporinæ*, for the structural characters of these wasps clearly show that they have different habits from those in the other subfamilies.

I have placed in this subfamily the very rare genus *Chirodamus*, Haliday, discovered by Charles Darwin, in South America, during his memorable voyage in the Beagle.

It was unknown to Kohl, while Dr. von Dalla Torre, evidently without an examination of a specimen, has placed it, in his Catalogus Hymenopterorum, as a synonym of *Pompilus*, Fabr.

Fortunately, I have recognized this rare genus among some material collected in 1888 by the U. S. Fish Commission steamer, Albatross, in South America, in the same locality, Strait of Magellan, in which Darwin took his single specimen 87 years ago.

The U. S. Fish Commission took three perfect specimens, and this seems to be the first time it has been taken since the single specimen taken by Darwin.

Table of Tribes.

1. Wings extending to or beyond the tip of the abdomen, the cubitus in hind wings originating *before* the transverse median nervure.....2.
   Wings somewhat abbreviated, hardly extending to the tip of the abdomen, the cubitus in hind wings interstitial with the transverse median nervure.
   Eyes not extending to the base of the mandibles, a wide space between; front femora *abnormally* swollen, with fascicles of hairs beneath, the tarsi short.....Tribe I., Chirodamini.
2. Eyes long, extending to the base of the mandibles or very nearly, at most with only a linear space between; front femora normal, not much swollen, the tarsi long .. ..Tribe II., Notocyphini.

Tribe I.—Chirodamini.

To this tribe belongs but a single genus—*Chirodamus*, Haliday. It may be recognized by the characters made use of in defining the tribe, but I add a few more:

Labrum prominent, subconvex, semicircular, front tarsal joints 2–4 very short; the hind tarsi very long, much longer than their tibiæ, mandibles long, pointed, edentate; scape of antennæ stout, as long as the first joint of the flagellum; prothorax rather long and wide; metathorax short, truncate posteriorly; claws with a median tooth beneath, ciliate; maxillary palpi 6-, labial palpi 4-jointed.....Chirodamus, Haliday.
(Type C. Kingii, Haliday.)

Tribe II.—Notocyphini.

Differs from the *Chirodamini* by the different shaped head, the long eyes, which extend to or nearly to the base of the mandibles, by the long tarsi, by the slenderer anterior femora, and by the different venation of the wings.

In the insertion of the antennæ the group comes nearest to the *Aporinæ*, to which it is unquestionably closely allied, but from that group it is at once separated by the prominent, free labrum and by the absence of a tarsal comb in the females.

The group is evidently parasitic, and possibly some of the genera defined in the *Aporinæ*, without a tarsal comb, will ultimately be removed to this tribe.

Table of Genera.

1. Third cubital cell very large, and along the cubitus very long, longer than the second; labrum long, trapezoidal, much longer than wide; ♂ antennæ normal..... .....Notocyphus, Smith.
(Type N. laevissimus, Smith.)

Third cubital cell triangular, smaller than the second; labrum semi-circular, wider than long; ♂ antennæ crenulate..... Allocyphonyx, Ashmead, g nov.
(Type Pompilus maurus, Cresson.)

Subfamily VI.—Ceropalinæ.

The Russian hymenopterologist, Gen. O. Radoszkowsky, was the first to correctly define the group. He called it a family in 1888.

In 1894, Mr. Wm. J. Fox, of the Philadelphia Academy of Sciences, probably from ideas derived from Radoszkowsky, treated it as a tribe.

It is unquestionably a natural group, differing in habits and many salient characteristics from all of the groups here recognized. The emarginate eyes, free labrum, straight antennæ, short pronotum, etc., as well as the characters of the male genitalia, as figured by Radoszkowsky, readily distinguish the group.

The species are parasitic in the nests of other Ceropalids or Pompilids. Benjamin D. Walsh was the first to demonstrate the parasitic

habits of these wasps. In June, 1868, he bred *Ceropales rufiventris*, Walsh, from the mud cells of *Agenia bombycina*, Cresson.

Table of Genera.

1. Cubitus in hind wings originating *before* the transverse median nervure ..... 2.
   Cubitus in hind wings originating *behind* the transverse median nervure ..... 3.
2. Metathorax posteriorly rounded, not obliquely truncate; clypeus anteriorly subarcuate; submedian cell in front wings *shorter* than the median; pronotum with the hind margin angularly emarginate ..... Agenioxenus, Ashm., g. nov.
   (Type Ceropales rufiventris, Walsh.)
3. Metathorax posteriorly obliquely truncate or depressed; clypeus anteriorly truncate; submedian cell in front wings never shorter than the median; pronotum with the hind margin arcuate or arcuately emarginate, not angularly emarginate.. Ceropales, Latreille.
   (Type C. maculatus, Latr.)

ENTOMOLOGICAL RECORD.

An interesting contribution by Dr. Fletcher, entitled "Entomological Record, 1901," has just appeared in the 32nd Annual Report of the Entomological Society of Ontario. This, besides giving a list of the active workers in Canada, includes careful notes on rarities, etc., taken during the year. It is the intention of the Society to continue this Record from year to year, and as this will undoubtedly prove useful to entomologists throughout Canada, it is hoped that collectors in the Dominion will try to make it as complete as possible. Records of interesting specimens captured, either from the standpoint of distribution or rarity, will be acceptable, and should be sent to Dr. James Fletcher, Central Experimental Farm, Ottawa. Specimens unknown to collectors will gladly be identified.

NEW DIURNAL LEPIDOPTERA FROM BOLIVIA.

BY A. G. WEEKS, JR., BOSTON, MASS.

(Continued from Vol. XXXIII., page 324.)

Pamphila barbara, sp. nov.

Habitat: Bolivia. Expanse: 1 12 inches.

Head, thorax and abdomen above, dark brown; below, gray. Antennæ dark brown, with white annulations at base of each joint. Club brown, white near base.

General colour of upper surface blackish brown. Hind marginal fringe of ground colour.

Upper side of fore wing has an indistinct white dot in apical area. Near centre of wing, under the end of discoidal space, are two prominent white dots, the upper being under median, the other being in next lower interspace, larger than the first and somewhat nearer base.

Upper side of hind wing without markings.

The hind marginal fringe of lower side of fore wing tends to grayish with a white thread. The ground colour is dead blackish brown. The costal area and apex are gray somewhat tinged with blue. There are three subcostal white dots. The gray apical area is crossed by a series of dots of the ground colour, parallel to hind margin and one-sixteenth inch within it. The inner marginal area tends to grayish. The rest of the wing is of ground colour, the two prominent white spots of upper side being repeated.

Under side of hind wing is gray, or, perhaps, dark brown, very heavily dusted with gray scales. Across the centre of the wing, running from centre of costa across to centre of hind margin and following contour of hind margin, is a series of six interspacial bluish marks of considerable prominence and bordered with a dark thread. The one bordering the end of discoidal space has a distinct black border at its basal side, giving the appearance of a black mark in centre of wing. The hind margin has a band of the same blue shade, one-sixteenth inch wide and edged on both sides by a blackish brown thread. Inner marginal area is gray and not encroached upon by dark markings. Hind marginal fringe gray, showing darker at ends of nervures.

Described from one specimen taken five days' travel north from Cochabamba, September 12, 1899.

NOTES ON THE EARLY STAGES OF CORETHRA BRAKELEYI, Coq.

BY JOHN B. SMITH, SC. D.

On June 1st, 1901, while on a mosquito hunt with Mr. J. Turner Brakeley, at Lahaway, we investigated the little pools around the head of a swamp spring. The water was very cold, and our object was, mainly, to ascertain whether *Aedes* larvæ occurred in such localities, where pitcher plants were in the vicinity.

In the course of our dipping I found a very odd little wriggler, altogether different from anything I had ever seen before, and soon Mr. Brakeley found the same thing. We took only a few of them at that time, and from their minute size I assumed they must be very young. I afterward sent a specimen to Dr. Howard, and he appeared as much at sea concerning its location as I was. It seemed to be a Culicid larva, without much doubt; but that was as far as we could get. The specimens were about an eighth of an inch in length, light reddish in colour, and very hairy in appearance. The head was very broad, and from it the body tapered gradually to the short obtuse anal siphon. Mr. Brakeley christened them "bull-heads," and I called them "triangles." They were kept alive a short time only, and during that period proved very sluggish.

July 27th, Mr. Brakeley was at Lahaway, and put in an hour dipping for mosquito larvæ in a lily pond at the foot of the garden. The pond is full of fish, but in the grassy shallows around the edge Culicids breed to a limited extent. Here he struck a little nest of the "bull-heads," and secured two dozen, which he carried to his town house in Bordentown. The little creatures remained almost motionless for hours, some at the surface, some below it at various points. Some had the anal siphon at the surface and the head a little below, the position being intermediate between that assumed by *Anopheles* and that assumed by *Culex*. Two of these little larvæ pupated on July 28th and others on the 29th, 30th, and 31st. On August 1st I went to Bordentown and took charge of the culture, expecting to get out almost anything rather than a Culicid.

The pupa was just as odd as the larva, and reminded me of a Lycænid chrysalis with a pair of breathing tubes. These pupæ were at the surface, and seemed to have little power of motion. They were easily submerged and easily drowned. Though I was as careful as I could well be, the jarring between Bordentown and New Brunswick meant death to several of them.

The first adult emerged August 2nd, a period of 4½ days from the first pupation, and this proved to be very close to the average period.

The insect was a male, very pretty, and utterly unknown to me; certainly not a long-billed mosquito. Mr. C. W. Johnson, to whom I submitted a specimen, made it Culicid on venation, but could not identify it with any described form.

Later Mr. Coquillett pronounced it a new species of *Corethra*, and, at my request, named it *Brakeleyi*, the description appearing in a recent number of the *Entomological News*.

August 13th, Mr. Brakeley sent me another lot of the larvæ, taken at the same place as the last lot, and stated that some very minute examples occurred, evidently babes.

Other collections were made September 17th, October 14th and October 20th. The latter was made after a heavy frost (min. 21° on the bog close by), and in each case half-grown to full-grown examples were found. No pupæ were found with the larvæ at any time, and no adults were collected.

The life-history is very imperfect: the egg stage is not known, nor the duration of the larval stage. We know that the larva occurs very late in the fall and quite early in spring, and I am inclined to believe that hibernation is in the larval stage; but I have no proof more positive than I have stated.

The larva was submitted to Dr. Dyar, who separates it from all other Culicid larvæ because it has the antennæ arising from the dorsal aspect of the head, close together, above the mouth. There is no mouth brush, the eyes are rounded, and the abdominal hairs are unequal.

The pupa is brown in colour, and floats parallel to the surface, with the long slender air tubes slightly projecting. It is entirely different from that of any other Culicid known to me.

The adult has mouth-parts similar to those of some Simuliids that I have seen; but I have not yet studied them closely.

The larva of this species is not in the least like the descriptions or figures of *Corethra* heretofore published, nor does it accord in any way with what Theobald says of the early stages of this genus. It agrees much better with *Mochlonyx*, except for the unusual position of the antennæ; but in the pupal stage it is utterly and completely unlike any other Culicid known to me or described by Theobald.

Based upon the early stages, *Corethra Brakeleyi* should form a distinct generic type.

NOTES ON SOME SOUTHERN CALIFORNIAN ORTHOPTERA.

BY JAMES A. G. REHN, PHILADELPHIA.

The following specimens were collected at San Diego, California, during the year 1901 by Mr. G. W. Dunn, and are now in the collection of the Academy of Natural Sciences of Philadelphia. The terms used in the descriptions are those adopted by Comstock and Kellogg in their recent work, "Elements of Insect Anatomy."

Family MANTIDÆ.

LITANEUTRIA OBSCURA, Scudder.

One immature male, November 13, 1901.

Family PHASMIDÆ.

SERMYLE ARBUSCULA.* n. sp.

Type, ♀; San Diego, California, May 7, 1901.

This species does not seem to be very closely related to any of the previously-known species of the genus. From *azteca*, Saussure, it is differentiated by having the femora carinate and striate; from *Saussurii*, Stal, by the non ampliate sixth abdominal segment; and from *strigata*, Scudder, by the more robust limbs and the less strongly striate body. With *Mexicana* and *linearis*, Saussure, no affinity exists.

General form slender, the thoracic portion rather robust. Head rather elongate, bearing two central longitudinal rugæ, which become obscure caudad, the whole surface of the head rather tuberculate, the tubercles being longitudinally disposed; eyes subspherical, slightly exserted; antennæ longer than cephalic femora, the proximal segment large and broad, with the distal section contracted, this segment over twice as large in bulk as the next. Pronotum, mesonotum and metanotum tuberculate, the tubercles resolving into longitudinal series, this being more apparent on the metanotum, the mesonotum and metanotum being centrally carinate; pronotum rather narrow, not quite equalling the head in length; mesonotum long (with pronotum equalling the cephalic femora), the lateral margins slightly tuberculate; metanotum very considerably shorter than the mesonotum, comparatively robust, expanding in the caudal portion. Abdomen rather slender, multistrigate, none of the segments exhibiting any special ampliation; ventral surface between the sixth and seventh segments exhibiting a pair of flattened longitudinal processes. Cephalic femora heavy, with the proximal diastema (found in

*In relation to the twig-like appearance of the insect.

many representatives of this family) rather well marked, the remaining section of the segment being inflated and with three prominent angles; tibiæ as long as the femora, quadrate, slightly tapering; first tarsal joint about as long as the succeeding ones. Intermediate femora short, triangular in section, equalling the metanotum (and median segment) in length: tibiæ depressed, about equalling the femora in length; first tarsal joint considerably less than the succeeding joints in length. Caudal femora short, reaching the middle of the third abdominal segment, roughly triangular in section; tibiæ rather longer, reaching to the apex of the first segment. General colour reddish brown, washed with ashy gray on the cephalic limbs.

Measurements:

Length of body	54 mm.
Length of pronotum	3 "
Length of mesonotum	12 "
Length of metanotum (with median segment)	8.7 "
Length of abdomen	28 "
Length of cephalic femora	14 "
Length of intermediate femora	7.5 "
Length of caudal femora	8.7 "

Family Acrididæ.

Arphia ramona, n. sp.

Types: ♂ and ♀; San Diego, California, April 4 (♂) and 30 (♀), 1901.

Allied to *A. Behrensi*, Saussure, but much larger, with the pronotal carinæ slightly arcuate and very slightly incised; the frontal costa is suddenly constricted superiorly and not tapering, while the posterior margin of the pronotum is rectangulate, with the angles more or less rounded instead of acute angulate. With *nietanna*, Saussure, the species needs no comparison.

♂. Size rather small. Head with the fastigium gently rounded, merging into the frontal costa with a slightly perceptible angle; vertex decidedly longer than broad, rather deeply excavated, the lateral margins subacuminate cephalad; frontal costa decidedly constricted dorsad, rather broad ventrad, slightly expanded at the ocellus, the dorsad section bearing a central low ridge, broadly sulcate at and ventrad to the ocellus; eyes sub-elliptical, equal to the ventro-ocular portion of the genæ; antennæ short, slightly expanded distad. Pronotum rugose, moderately

expanded caudad; cephalic margin obtuse-angulate, caudal margin rectangulate; median carina rather low, slightly arcuate, very slightly incised; lateral lobes subquadrate, rugose on the metagonal portion, cephalic and caudal margins parallel, ventral margin obtusely trimmed cephalad. Tegmina rather long, considerably exceeding the hind femora, broadly rounded proximad. Posterior femora stout, with prominent dorsal and ventral keels.

General colour blackish-brown, the dorsal aspect of the tegmina with a longitudinal bar of brownish ochraceous; abdomen dull yellow; posterior tibiæ deep cobalt blue, with a lighter subproximal ring, spines black.

♀. Size large. Head with the vertex cordiform, the cephalic portion completely closed; frontal costa considerably constricted superiorly, subequal at and below the ocellus, supplementary intermediate ridge subobsolete; eyes elliptical, considerably shorter than the ventro-ocular portion of the genæ; antennæ moderately long, slightly expanded distad. Pronotum essentially as in the male. Tegmina rather long, slightly exceeding the body, considerably exceeding the hind femora. Wings rather large, equal to the tegmina in length.

General colour grayish brown, the tegmina sprinkled with spots of darker brown, giving a "salt-and-pepper" appearance to the latter parts; outer face of the posterior femora obscurely washed with hoary; posterior tibiæ ultramarine blue with a sub-proximal ring of dull pinkish, the spines black. Wings with the disc and the greater part of the cephalic margin reddish orange, the ulnar stigma and the periphery dull blackish brown, the distal portion of the humeral field smoky hyaline.

Measurements:	♂.	♀.
Length of body	22.5 mm.	37.5 mm.
Length of pronotum	5 "	7.5 "
Length of tegmina	22 "	32 "
Length of hind femora	13 "	19 "

The total number of specimens of this species examined was eleven—four males, seven females.

ARPHIA HESPERIPHILA, n. sp.

Types: ♂ and ♀; San Diego, California, April 4 and October 30, 1901.

Allied to *A. arcta* and *A. conspersa*, Scudder, but distinguished from the former by the higher pronotal crest, by the more robust posterior femora, the shorter ulnar stigma, and the more definite wing arc; from

conspersa it is distinguished by the sub-rotundate vertex, the more uniformly-coloured pronotum, and the colour of the disc of the wings and of the hind femora.

♂. Size very small (for this genus). Head rugulose; vertex elongate, rather deeply excavated, fastigium foveolate; frontal costa constricted dorsad, gently expanded ventrad, shallowly sulcate in the vicinity of the ocellus; eyes slightly prominent, elliptical, not equalling the ventro-ocular portion of the genæ; antennæ short, distal section gradually enlarged. Pronotum rugose on the prozona, punctate on the metazona, slightly constricted centrally; cephalic margin finely obtuse-angulate, caudal margin rectangulate; median carina moderately high, arcuate on the prozona, narrowly cut by the transverse sulcus; lateral carina marked in the metazona, obscure and sinuous on the prozona; lateral lobes deep, the ventral margin sinuate cephalad. Tegmina rather long, distal extremity truncate. Caudal femora heavy, genicular region only slightly enlarged. General colour wood brown, varied and sprinkled with black; the distal portion of the tegmina black, which tint also suffuses the pleuræ and genicular lobes and outer face of the caudal femora; caudal tibiæ ultramarine blue, the genicular portion black, the usual proximal ring greenish white.

♀. Size small. Head with the fastigium shallowly foveolate; frontal costa expanded at the ocellus, shallowly sulcate in the portion cephalad to this point; eyes rather small, considerably smaller than the infra-ocular portion of the genæ. Pronotum with cephalic margin of the lateral lobes subarcuate.

General colour wood brown, the genicular portion of the caudal femora suffused with blackish, which tint also forms several indistinct transverse bars on the tegmina. Wings with the disc sulphur yellow; the arc pale blackish brown, not evanescent and not reaching completely around the caudal margin of the wing or to the anterior margin, stigma short, cephalic margin obscurely with blackish brown distad, proximal area (except the above-mentioned margin) hyaline.

Measurements:	♂.	♀.
Length of body	14 mm.	22.5 mm.
Length of pronotum	3.5 "	4.7 "
Length of tegmina	16 "	19.5 "
Length of hind femora	9.5 "	11.5 "

Five specimens examined, two males, three females.

CHIMAROCEPHALA PACIFICA (Thomas).

Three females; March 23 and 24, and April 10, 1901.

STICTHIPPUS CALIFORNICUS (Scudder).

Two females; June 14 and August 13, 1901.

An examination of these two specimens shows that *marmosatus*, Scudder (Psyche, VI., p. 318), is probably only a variation of this form, one of the specimens having the anal vein free on one tegmen and entangled on the other, this character being used by Scudder as a differential one, while the maculations of the tegmina seem of no greater value.

SPHARAGEMON VENUSTUM (Stal).

Four males and three females; May 18, 20, 25 and 28, and June 5, 1901.

These specimens have the hind tibiæ glaucous or dull lutescent instead of blue.

DEROTMEMA SAUSSUREANUM, Scudder.

One immature female and one male; July 17, 1901.

CONOZOA BEHRENSI, Saussure.

Six specimens: four males, two females; September 22 and October 3, 1901.

TRIMEROTROPIS REBELLIS (Saussure).

Trimerotropis cristata, Rehn (not of McNeill), Trans. Amer. Ent. Soc., XXVII., p. 333.

Four specimens: three males, one female; April 14 and May 18 and 28, 1901.

TRIMEROTROPIS VINCULATA, Scudder.

Twenty-nine specimens: ten males, 19 females; March 23, April 4, 11, 17, 22 and 30, May 9, 15, 18, 25, 28 and 31, June 5, July 25, and October 22 and 30, 1901.

HELIASTUS CALIFORNICUS (Thomas).

One female; March 29, 1901.

DRACOTETTIX MONSTEROSUS, Bruner (?).

One immature female; May 4, 1901.

This specimen differs somewhat from Bruner's figure of *D. monsterosus* (Proc. U. S. Nat. Mus., XII., pl. 1, fig. 1), mainly in the form

of the lobes of the median carina and of the lower part of the face. As the specimen is immature, these differences may be those of immaturity. No relationship exists with *D. plutonius*, Bruner (North Amer. Fauna No. 7, p. 267).

SCHISTOCERCA VAGA (Scudder).

Two females; April 24 and July 17, 1901.

ÆOLOPLUS CHENOPODII ARCUATUS, n. subsp.

Type: ♂ and ♀; San Diego, California, May 18 and 28, 1901.

Very closely allied to *Æ. chenopodii* from Grand Mesa, Colorado, but differing in the rotundate caudal margin of the subgenital plate, this region in *chenopodii* being acuminate (see Scudder, Proc. U. S. Nat Mus., XX., pl. V., fig. 9), and in the more apparent prozonal median carina, this section being "wanting or rarely indicated" in *chenopodii*.

Size medium. Pronotum with the pronotal carina quite distinct, except on the caudal portion of the prozona, where it is obsolete. Subgenital plate of the male with the caudal margin rotundate; cerci tapering to a very fine point.

Colour apparently the same as true *chenopodii*.

Measurements:	♂.	♀.
Length of head and body	15.5 mm.	22 mm.
Length of pronotum	4.2 "	6 "
Length of tegmina	4.2 "	5.5 "
Length of posterior femora	11.5 "	14 "

Four specimens of this species have been examined: two males, two females.

MELANOPLUS RILEYANUS, Scudder.

One female; April 10, 1901.

Family TETTIGONIDÆ.

CONOCEPHALUS MEXICANUS, Saussure.

One female; May 13, 1901.

Family GRYLLIDÆ.

GRYLLUS ASSIMILIS (Fabricius).

One male; July 28, 1901.

This is much smaller than Mexican specimens of *assimilis*, but it is clearly the same species.

SOME NEW NORTH AMERICAN FULGORIDÆ.

BY E. D. BALL, FORT COLLINS, COLORADO.

Some time ago, when about to publish a synopsis of the genus *Scolops*, the writer discovered that Dr. Uhler had the same genus in hand and his MSS. ready for the press. As the result of the correspondence, the writer dropped his work for the time, and Dr. Uhler promised to send his types as soon as his paper was published. (Proc. Md. Acad. Sc., p. 401, 1900.) With his usual thoughtfulness, the Doctor sent on the types, and with the aid of these and a fine series of eastern forms received from Mr. Otto Heidemann the author has been able to definitely place all the described species and recognize a number of new ones.

The genus is found in its greatest abundance in the border line of plain and mountain region, and so many new forms have been found here in the past few years that there are no doubt many more to be found on further search.

All but one or two of the species have been found to occur in two wing lengths; one in which the elytra are about the length of the abdomen and the under wings very short and probably not functional; the other in which the elytra are long and flaring, the wings well developed.

On account of the curved or angled nature of the cephalic process, the measurement of its length is a somewhat difficult matter. In the present paper the length given has been measured in a straight line from the tip to the middle of the eye.

Scolops Osborni, n. sp.

Form and structure of *sulcipes*, but larger and with a stouter process. Colour pale yellow as in the lighter species of *hesperius*. Elytra light, sparsely dotted with fuscous. Length: macropterous examples 11 mm., brachypterous 9 mm.; length of horn 3 mm.; width 4 mm.

Cephalic process long and slightly bent at the sulcus, larger than in *sulcipes* and not constricted beyond the sulcus, as large as that of *hesperius*, but regularly tapering anteriorly. Elytra with the two inner nervures of corium forked well before the middle and one branch at least of each again forked before the apex of clavus, cross nervures not as numerous as in *sulcipes* and very faint except at apex.

Colour: cephalic process and face yellow, pronotum and scutellum straw colour, a pair of pitchy black spots on the sides of the pronotum

just back of the eyes, which they exceed in diameter; a pair of dots on the disc and four black dots on posterior margin of scutellum. Elytra pale, the nervures concolorous, margined with regularly-arranged pairs of black dots, the costal and apical margins with large quadrate black spots; cross nervures, except at apex, unmarked.

Described from seven specimens; three from Sioux City, Iowa (Osborn); three from Onaga, Kans. (Crevecœur), and one from Effingham, Kans. (Van Duzee). The double furcation of the nervures will separate this from any but *sulcipes*, and the larger process and the lighter colour will readily differentiate it from this latter species.

Scolops Uhleri, n. sp.

Resembling *angustatus* and *perdix*, but much shorter-bodied and with a long straight process. Length 6.5–8 mm., process 2–3 mm.; width 2.5 mm.

Cephalic process long and straight, half longer than front, parallel margined, two-thirds the width of the vertex, vertex convex. Elytra straight and narrow as in *angustatus*, but much shorter, the middle sector forking farther back than the inner one.

Colour: face and apical process pale soiled yellow, the lateral margins of the latter dull brown, pronotum and scutellum pale, more or less clouded, a pair of rather large round spots on disc of pronotum and another pair near apex of scutellum. Elytra with the broad outer margin and most of the inner margin pale or milky white; just inside the outer sector is a broad smoky or dark brown stripe, very definite on the outer margin and fading out internally. This stripe is sparsely interrupted with light dots on the nervures.

Described from twenty-four examples from Grand Junction, Colo. The small, square-set body, together with the remarkably long, straight process, renders this a strikingly distinct form. The process is twice as long as in *angustatus* and considerably longer than in *perdix*. It is also stouter and strictly parallel-margined, while in those species it tapers.

Scolops maculosus, n. sp.

Form of *Uhleri* nearly, body distinctly oval, the process shorter and stouter, resembling *robustus* in shape and colour, but smaller. Length: ♀ 7 mm., ♂ 6 mm., process 2 mm.; width 2.75 mm.

Cephalic process stout, almost as wide as the vertex, a trifle enlarged at the apex, as long as the front, slightly curved upward. Elytra

rounding, but little longer than body, two inner sectors of corium usually forking together and about opposite where the claval nervures unite.

Colour: face and lower surface of process pale yellow, rest of process, except dorsal carinæ, deep brown. Pronotum and scutellum irregularly clouded, a pair of spots, each, on vertex, pronotum and scutellum. Tegulæ with the disc black. Elytra pale, the costal margins broadly light, rest of elytra with rather large light and dark spots along the nervures, usually a very definite light spot just before the forking of the ulnar nervures.

Described from twenty-four specimens, all from Colorado, where it is very generally distributed.

Scolops viridis, n. sp.

Form of *angustatus* nearly, but broader, as broad as *perdix*. Green, with pale smoky spots on elytra. Length: ♀ 8 mm., ♂ 7 mm., process 2 mm.; width 3.5 mm.

Cephalic process small, straight, parallel-margined, slightly longer than front, less than half the width of the broad vertex. Elytra rather broad, longer than body, the normal form very long and flaring in macropterous examples, two inner sectors forking just back of middle of elytra, the middle one usually a trifle in advance of the other.

Colour: light green, a pair of black spots on each, pronotum and scutellum. Elytra with a rather narrow light stripe on costal margin, the nervures bright green, alternately interrupted with light and margined with pale smoky yellow.

Described from twenty-four specimens from Grand Junction and Pueblo, Colo. The green colour renders this quite distinct and introduces a new feature into the genus.

Scolops abnormis, n. sp.

Form and general appearance of *grossus*, slightly lighter coloured and with a larger process and simpler venation. Length 8 mm., width 3.5 mm., process 3 mm.

Cephalic process upturned, much inflated, slightly wider than the vertex or the front between the eyes, median carinæ of front becoming obsolete on process, lateral carinæ slightly widening and dividing the width into three equal parts, process slightly longer than front, the sulcus indistinct, eyes rather prominent, head definitely constricted back of eyes so that they are remote from pronotum. Elytra moderately long, somewhat flaring behind, the middle sector simple.

Colour: cephalic process brown with small light maculations, the lower face between the carinæ and the front pale. Body and elytra pale gray, a pair of black spots on scutellum and more or less of brownish maculation on pronotum and elytral nervures.

Described from two specimens from San Jose, Calif. (King). The immense size of the process will at once separate this from *pallidus*, which it resembles in venation and colour.

Scolops Vanduzei, n. sp.

Form of *maculosus* nearly, but larger, resembling *abnormis*, but with much smaller process. Rusty straw-coloured. Length 7 mm., width 2.75 mm., process 2 mm.

Cephalic process not quite as wide as vertex, as long as front, strictly parallel-margined, lateral carinæ of lower face parallel, not enclosing over one-third of its width, head not constricted behind the eyes. Elytra longer than the body and well rounded behind, resembling *hesperius*, venation distinct, veins strong, middle sector usually forked slightly behind the inner one.

Colour: process mottled with fuscous and pale shading out to greenish fuscous on face, vertex with a fuscous crescent interrupted by the median carinæ, four fuscous spots in a transverse row on the pronotum and four more on the scutellum. Elytra pale smoky or grayish, the nervures light with light spots sparsely sprinkled along them, almost continuously margined with fuscous.

Described from eight examples from Kimball, Neb.

Scolops robustus, n. sp.

Resembling *maculosus*, but broader, stouter and with a cephalic process like *angustatus*. Length: ♀ 6 mm., ♂ 5.5 mm.; width 3 mm., process 1.25 mm.

Cephalic process very small and short, shorter than front, not over one-half the width of vertex, parallel-margined, vertex and eyes short and broad, head slightly constricted behind eyes, pronotum very short and broad, which gives the whole insect a broad, square-set appearance. Elytra either broad and square-set or very long and flaring, the middle sector usually forking slightly behind the inner one.

Colour: process greenish or smoky, the carinæ pale, vertex with a pair of small fuscous points, pronotum distinctly lighter, appearing as a light "collar," a pair of large round spots on disc, a pair of smaller points

against the carinæ outside, black. Tegulæ smoky brown, scutellum brownish or pale, with four large fuscous spots. Elytra milky white, clouded with brown along the light-dotted nervures, a pair of slightly oblique fuscous stripes towards the apex in the long-winged examples.

Described from twenty-four examples from various points in Colorado. Readily separated from all other species by the broad form and short process.

Cixius cultus, n. sp.

Resembling *stigmatus* without basal band, smaller and narrower. Narrower than *pini*, with a longer vertex. Length: ♀ 6 75 mm., ♂ 5 mm.; width 2 mm. Vertex longer than breadth at base, acutely triangular at apex, with the bounding carinæ distinct, apex distinctly overhanging front. Front rather narrow, enlarged over the antennæ beyond the line of the marginal curve, median and lateral carinæ distinct as in *coleopeum*. Elytra very long and narrow, parallel-margined.

Colour: black, the carinæ of front and vertex, all the pronotum except the area behind the eyes, the tegulæ and the carinæ of scutellum, light. Sometimes the carinæ on front and scutellum are reddish. Elytra milky, sometimes slightly clouded with smoky and with a pair of smoky spots before the middle and another faint one inside the stigma. Stigma small and oblique.

Male pygofers short, with the posterior margin deeply notched, the apex of the notch with a short tooth. Styles about equalling the pygofers, slender at base, broadening out into a slipper-shaped apex, with the toe out. Anal tube without teeth below. Entire genitalia black.

Described from ten specimens from Calif., two from Kans. and nine from Colo. The elongate vertex and narrow form will readily separate this from any other described species.

Oliarus aridus, n. sp.

Resembling *panzeri*, but more elongate, as large as *5-lineatus*, but with longer and narrower elytra. Length: ♀ 7.25 mm., ♂ 6.5 mm.; width 3 mm.

Vertex shorter and broader than in *5-lineatus*, but little longer than wide, parallel-margined on posterior half, then rounding to a blunt apex, posterior margin angularly notched, face much broader than in *5-lineatus*, nearly flat transversely, with distinct carinæ. Elytra long and narrow, with a rather small stigma.

Colour: vertex fuscous, the carinæ light yellow, a definite light spot on the carinæ against the eyes, face testaceous, the carinæ slightly lighter, a larger light spot on each side below the antennæ. Pronotum dark, the carinæ and margins broadly light, scutellum testaceous, a dark stripe outside the carinæ. Elytra milky or hyaline, nervures very lightly marked, stigma and cross nervures fuscous.

Male pygofers long, ventral notch rather shallow, with a slender tooth, lateral margins of pygofers produced into a pair of teeth. Styles extending half their length beyond the pygofers, their inner margins appressed, narrow, nearly cylindrical at base, the apical half broad and obliquely truncate, together spear-shaped. Pygofers black, the posterior margins, tooth and styles, yellow.

Described from twenty-four specimens from Kans., Calif., and various parts of Colo.

Oliarus complectus, n. sp.

Form and general appearance of *aridus*, but much smaller. Smaller and narrower than *humilis*. Length: ♀ 5.5 mm., ♂ 4.5 mm.; width 1.75 mm.

Vertex nearly half longer than broad, narrowing from the base to the narrow truncate apex, lateral foveæ long and narrow. Vertex definitely produced in front of eyes and angulate with front, front narrower than in *aridus*. Elytra long and narrow, with a definite stigma.

Colour: vertex black, the carinæ light yellow; face, pronotum and scutellum varying from testaceous to black, the carinæ usually light. On very dark specimens those on scutellum often obscure. Elytra subhyaline, the nervures yellow and unmarked with black spots before the stigma. Back of this more or less smoky and black punctured.

Male pygofers rectangularly notched, with a long slender tooth. Styles extending one-third their length beyond the pygofers, then curving around and passing back under their margins again.

Described from twenty-four specimens from Hayti, W. I., Md., Kans., Ariz., and various places in the southern half of Colo. The small size and unmarked nervures will separate this species from any other described.

Oliarus sementinus, n. sp.

Short and robust, the elytra flaring as in *humilis*. Colour of *complectus* nearly. Length: ♀ 5 mm., ♂ 4.25 mm.; width 2.25 mm.

Vertex short and broad, nearly twice wider than long, the anterior margin roundingly angulate, almost parallel with the emarginate posterior margin, vertex scarcely reaching the anterior margin of eyes, beyond which the gibbous front extends for about half the length of vertex. Face very broad and full, convex, with the median carina indistinct or wanting. Elytra broad and flaring, nervures strong, weakly black-punctured and beset with long white hairs.

Colour: vertex and front dark testaceous, the carinæ light yellow, pronotum light, scutellum light testaceous. Elytra milky subhyaline, nervures brownish at the base, then smoky, the cross nervures and apex margined with fuscous, the nervures clothed with long white hairs.

Male pygofers long and slender, deeply angularly notched with a small tooth. Styles as in *complectus*, but longer and leaving a large open space in the curve.

Described from seventeen specimens from Las Animas, Colo. Easily distinguished by the short head.

Myndus viridis, n. sp.

Form of *impunctatus* nearly, but smaller and narrower. Length: ♀ 5 mm, ♂ 4.5 mm.; width 1.5 mm.

Vertex twice longer than wide, very slightly constricted before the middle, face as in *impunctatus*, the median carinæ of clypeus indistinct. Elytra long and narrow, without a stigma.

Colour: bright grass green, fading to yellowish-green in old specimens. Elytra subhyaline.

Male pygofers almost truncate posteriorly, with a triangular median tooth. Styles moderately long, their enlarged oval apices slightly overlapping.

Described from fourteen examples from Grand Junction and a pair from Ames, Iowa. The green colour will at once separate this from any described species.

Myndus impiger, n. sp.

Form and general appearance of *impunctatus*. Smaller and less plainly marked. Length ♀ 4.5 mm.; width 1.5 mm.

Vertex rather broad, expanded at the base, where it is more than half as wide as its middle length, face broad, the median carinæ of clypeus distinct throughout. Elytra similar in shape to those of *impunctatus*, broader than in *viridis* and with a distinct stigma.

Colour: vertex and face testaceous, usually a horseshoe-shaped light mark on front, pronotum fuscous in front, forming a collar behind the eyes, the posterior margin and broad lateral areas light, scutellum testaceous, the carinæ rather lighter. Elytra subhyaline, the nervures brown or testaceous, sometime the apical ones clouded with fuscous.

Described from eight females from Palmer Lake, Ridgeway and Fort Collins, Colo. All taken in the mountains.

Myndus Slossoni, n. sp.

Short and stout. Black, with the margins of elytra and a median saddle light yellow. Length 4 mm., width 1.25 mm.

Vertex very broad, but slightly carinate, scarcely angled with front; front similar to *impiger*, eyes large, together with vertex nearly as broad as the pronotum. Pronotum very short, angulate behind, scutellum as in *impunctatus*, strongly tri-carinate. Elytra shorter and broader than even in *impunctatus*.

Colour: vertex, face, legs and pronotum leather-brown, lighter below. Eyes, scutellum and elytra black, the costal margins of elytra with narrow white stripes extending back beyond apex of clavus, a pale yellow, illy-defined saddle occupying nearly all the claval areas back of the apex of scutellum in the female and extending nearly to the costal stripes in the male.

Male pygofers with a semicircular excavation bearing a minute knobbed median process. Styles long, touching in the middle, then obliquely divergent. Anal tube with an acute median ventral process.

Described from a single pair from Biscayne Bay, Fla. Collected by Mrs. Slosson and sent me by Mr. E. P. Van Duzee. The head is proportionally larger (broader) in this form than in any other of our species.

Œcleus lineatus, n. sp.

Resembling *decens*, but smaller and lighter coloured. Vertex narrow, right-angled. Length: ♀ 5.5 mm., ♂ 5 mm.; width 2.25 mm.

Vertex reduced to a line, over five times longer than wide, slightly wider in front than behind, projecting some distance in front of eye and meeting front in a right angle, the lateral carinæ elevated and nearly meeting behind, forming a trough. Front concave, narrow, broadening out below the middle, where it is over three times as wide as at the base,

the median carinæ obsolete at base, pronotum short, scutellum with five carinæ.

Colour: vertex and front fuscous, the carinæ light, scutellum fuscous on disc, the carinæ and lateral margins light testaceous. Elytra hyaline, the nervures pale, rather sparsely dotted with fuscous, becoming thicker towards apex, legs and below mostly pale.

Male genital segment long and parallel margined, the ventral margin produced into a broad triangular tooth which is produced at apex into a short stout tooth. Styles in a horizontal plane, longer than the tooth, strap shaped, their outer margins rounded at apex, their inner ones produced into short reflexed hooks.

Described from one female and two males from Phœnix, Ariz. (Kunze.) The narrow produced vertex will at once distinguish this species.

Œcleus excavatus, n. sp.

Form and structure of *lineatus* nearly, narrower, darker, with a broader vertex. Length 5 mm.; width 1.75 mm.

Vertex parallel-margined, twice as wide as in *lineatus*, length three times its width, projecting in front of eyes as far as in *lineatus* and meeting the front in a still sharper angle, front broader above and narrower below than in *lineatus*, base over half as wide as the apex, the median carina extending to base. Elytra long, narrow, folded at rest.

Colour: vertex and face black, the carinæ light, scutellum fuscous, the five carinæ and sometime the margin testaceous. Elytra milk-white, the sutural margins creamy, interrupted with black near the middle and again at apex of clavus, nervures pale, thickly beset with large black spots somewhat confluent towards apex. Below fuscous.

Male genital segment long cylindrical, the posterior margin ventrally produced into a long narrow tooth, constricted at the base. Styles long, the shape hidden by the wax with which they are coated.

Described from four specimens, three females and one male, from Wray, Lamar and Fort Collins, Colo.

Œcleus obtusus, n. sp.

Resembling *excavatus*, but stouter and with a shorter vertex. Length: ♀ 6 mm., ♂ 5 mm.; width 2 mm.

Vertex rather narrow, three and one-half times as long as its apical width, still narrower at base, extending scarcely more than the width of

the carinæ in front of the eye and meeting the front in an obtuse angle. Face in profile rounding, about equally margining eye from the base to the ocelli, front constricted at base, where it is one-third the width between the antennæ, the median carina obsolete at base. Pronotum roundingly emarginate posteriorly, the lower posterior angle scarcely, if at all, inclined backwards.

Colour: vertex and front fuscous, the carinæ light, scutellum testaceous, carinæ testaceous. Elytra milky, the nervures smoky brown, with very faint punctures, sometimes light at base, the punctures slightly more distinct.

Posterior margin of male genital segment in the form of an equilaterally triangular tooth. Styles but little longer than the tooth, broad at base, narrowing down to just before the apex, where they are knobbed and produced into stout hooks on the inner margin.

Described from twenty-four specimens from Neb., Kans., Colo. and Utah.

Œcleus campestris, n. sp.

Form and general appearance of *obtusus*, slightly larger, darker and with a broader vertex and front. Length: ♀ 6 mm., ♂ 5 mm.; width 2.25 mm.

Vertex broad and short, but little over twice longer than wide, meeting the front in an obtuse angle, which is produced but a trifle in front of the eye. Front broad, rather flat, regularly widening from the broad base to just before the apex, where it is scarcely twice as wide as at the base, the median carina usually extending to base, pronotum longer than in *obtusus*, the posterior margin broadly angulate, the lower posterior angles acute and inclined backwards.

Colour: vertex and front black, the carinæ light, scutellum brownish, with the five carinæ testaceous and often another pair of testaceous lines outside these. Elytra hyaline, the nervures yellow, heavily marked with dark spots, the sutural margin light, often twice interrupted with fuscous and the stigma is often fuscous marked.

Male genital segment produced posteriorly in a rounding or obtusely triangular lobe, produced at the apex into an acutely triangular tooth. Styles long, set vertically, expanded towards the apex and bearing on their inner faces, at nearly one-third their length from the apex, rounding or cylindrical protuberances.

Described from twenty-four examples from Lamar, Colo.

Œcleus fulvidorsum, n. sp.

Form of *obtusus* nearly, but smaller and with a tricarinate scutellum. Colour pale yellow, scutellum fulvous. Length: ♀ 5 mm., ♂ 4 mm.; width 1.75 mm.

Vertex a little over three times longer than wide, parallel margined, meeting front in an obtuse angle as in *obtusus*, front short and broad at base, where it is half as wide as at apex. Pronotum angularly excavated posteriorly, scutellum tricarinate or with another pair of very faint carinæ.

Colour: pale creamy yellow, the clypeus and scutellum fulvous. Elytra pale creamy, the nervures concolorous, dotted with testaceous beyond the apex of clavus.

Male genital segment long, posterior margin produced in the form of a narrow finger-like process, slightly widest at base. Styles stout, subcylindrical, but little longer than the process, their apices nearly truncate, a pair of short stout processes on their inner faces just before the apex.

Described from twenty-three specimens from Grand Junction, Colo., and one from Phœnix, Ariz. The pale yellow colour and the tricarinate scutellum easily separate this species.

Œcleus acutus, n. sp.

Form of *lineatus* nearly, lighter coloured, with a narrower vertex and tricarinate scutellum. Length 5.5 mm.; width 2 mm.

Vertex very long, simply a line on the posterior half, widening out slightly beyond the eyes, extending nearly half its distance in front of eyes and meeting front in an acute angle, front very narrow, evenly rounding in profile. Pronotum long and shallowly excavated posteriorly, scutellum tricarinate, the two lateral carinæ very near the median one.

Colour: pale yellow, slightly washed with orange on disc of scutellum. Elytra subhyaline, the nervures light with very small fuscous punctures.

Male genital segment produced into a broad short tooth with an obtusely rounding apex. Styles narrow, twice as long as the tooth, broadened at the apex, before which there is a recurved tooth on the inner margin.

Described from two males from Port au Prince, Hayti. (R. J. Crew.)

A glance at the long vertex and the three close-set carinæ on the scutellum is all that is necessary to determine this species.

COCCIDÆ OF BRITISH NORTH AMERICA.

BY GEORGE B. KING, LAWRENCE, MASS.

(Continued from Vol. XXXIII., page 336, 1901.)

Eulecanium fraxini, n. sp.—Adult ♀ scale 6 mm. long, 5 broad, 2 high; some individuals are practically circular in outline and variable in size. In July the scales are well covered with a grayish powdery secretion; this being removed they are reddish brown, considerably wrinkled and pitted, surface shiny, texture thick.

Boiled in potash the derm becomes very clear and transparent, showing some large gland-pits 24 μ in diameter. Mouth-parts, legs and anal plates tinged with yellow. Antennæ practically colourless, of 7 joints, measuring in μ as follows:

Joint 1	(32)	2	(48)	3	(60)	4	(36)	5	(28)	6	(20)	7	(40)	in μ
"	24	"	44	"	64	"	40	"	24	"	20	"	36	
"	40	"	40	"	68	"	56	"	24	"	24	"	48	
"	40	"	44	"	68	"	56	"	24	"	24	"	52	

The last two lines of measurement seem to be of the normal type with a formula of 34721 (56).

Legs thin; front leg, coxa 84. Femur × trochanter 180. Tibia 136. Tarsus 60 in length. Middle leg, coxa 108. Femur × trochanter 176. Tibia 120. Tarsus 56. Hind leg, coxa 120. Femur × trochanter 196. Tibia 132. Tarsus 64.

The average width of the legs, coxa 52, trochanter 52. Tibia 24. Tarsus 16. Spines of lateral clefts in threes, nearly of equal width and in length 36 and 56 μ, respectively. Marginal spines 24 μ long. Rostral loop long and stout.

Hab.—Ottawa, Ont., on twigs of white ash *(Fraxinus Americana)*. Coll. Dr. Fletcher, November 2, 1901, and found by me at Andover, Mass., July 16, 1899, also on white ash. The slide mount which was prepared at that time does not show the derm gland-pits, but they were distinctly seen when the mount was made.

The scales have considerable superficial resemblance to *Eulecanium cerasifex*, Fitch, and *E. cynosbati*, Fitch. Structurally it differs from *Cynosbati* in not having 7 × 8 jointed antennæ, and in the form of 7 joints which has a very long third joint.

Dr. Fletcher also sent some blackberry twigs infested with *Aulacaspis rosæ*, which he received from Mr. J. D. Evans, of Trenton, Ont. They seem to be particularly abundant on the lower branches of the bushes (as is usually the case with this species). The species are from the same plantation where *Eulecanium Fitchi* was so remarkably abundant last summer.

Just recently I have received from Rev. Dr. Fyles, *Aspidiotus hederæ*, Vall., on ivy *(Hedera)*; *Lecanium hesperidum*, L., on flowering maple *(Abutilon)* and on *Euonymus* sp., and *Dactylopius citri* on passion-flower, all found in a dwelling house at Levis, Quebec. The *Dactylopius* is new to the Canadian list and perhaps has been taken to be the very common pest of the greenhouse, *Dactylopius longispinus*, Targ. At this writing (February 24, 1902) there remain only two other species of *Coccidæ* from British North America not studied and probably new, received from Mr. John Dearness.

Below is a check-list giving their geographical distribution throughout the provinces:

Eriococcus borealis, Ckll.	Yukon Territory (Dawson City).
Phenococcus Dearnessi, King.	Ontario (London).
Ripersia basi, Ckll.	Ontario (Toronto).
Dactylopius longispinus, Targ.	In all the provinces.
" citri, Boisd.	There is little doubt but this can be found in all the provinces.
Kermes Pettiti, Ehrh.	Ontario (Rice Lake).
Orthezia Americana, Walk.	Ontario, Quebec.
Asterolecanium variolosum, Ratz.	Ontario (Niagara, Ottawa).
Lecanium hesperidum, L.	In all the provinces.
" pseudhesperidum, Ckll.	Ontario (Ottawa).
" pini, King.	Ontario (London).
Eulecanium pyri, Schn.	Prince Edward Island.
" antennatum, var. Ckll.	Ontario, Quebec.
" juglandis, Bouché.	Ontario, Nova Scotia.
" quercitronis, Fitch.	Ontario (London).
" Fitchi, Sign.	Ontario, Nova Scotia, Manitoba.
" Canadense, Ckll.	Ontario (Ottawa, Arnstein), Nova Scotia, Manitoba.
" Fletcheri, Ckll.	Ontario (Ottawa).

Eulecanium	maclurarum, Ckll.	Ontario (Niagara).
"	caryarum, Ckll.	Ontario (Niagara).
"	nigrofasciatum, Perg.	Ontario (St. Catharines).
"	cerasifex, Fitch.	Ontario (Niagara Peninsula).
"	pruinosum, Cqul.	Ontario (St. Catharines).
"	Websteri, Ckll. and King.	Ontario, Nova Scotia, Prince Edward Island.
"	caryæ, Fitch.	Ontario (St. Catharines).
"	armeniacum, Craw.	Quebec (Sherbrooke).
"	cynosbati, Fitch.	Ontario.
"	corylifex, Fitch.	Ontario (Ottawa, Nepigon), Quebec (Aylmer).
"	quercifex, Fitch.	Quebec (Knowlton).
"	rosæ, King.	Quebec (Sherbrooke).
"	capreæ, L.	Nova Scotia (Dartmouth).
"	persicæ, Fabr.	Nova Scotia.
"	vini, Bouché.	Nova Scotia (Kentville).
"	Guignardi, King.	Ontario (Niagara).
"	Lymani, King.	Quebec (St. Hilaire, North Hatley).
"	fraxini, King, n. sp.	Ontario (Ottawa).
Pulvinaria	innumerabilis, Rathv.	Ontario.
"	brassicæ (?), Ckll.	Ontario.
"	occidentalis, Ckll.	Nova Scotia (Dartmouth), Prince Edward Island, British Columbia.
"	tiliæ, King and Ckll.	Ontario.
"	viburni, King.	Ontario, Quebec (Aylmer).
Eriopeltis	festucæ, Fonsa.	Nova Scotia, abundant; Ontario (Ottawa, rare).
Aspidiotus	hederæ, Vall.	Ontario, Prince Edward Island.
"	Forbesi, Johns.	Ontario, Quebec, Nova Scotia.
"	ancylus, Putn.	Ontario, Quebec, Nova Scotia.
"	ostreæformis, Curt.	British Columbia, Ontario, Prince Edward Island.
"	perniciosus, Comst.	Ontario.
"	Dearnessi, Ckll.	Ontario (London).
"	diffinis (?), Newst.	Ontario.
Chrysomphalus	dictyospermi, Marg.	Ontario.
Aulacaspis	rosæ, Bouché.	Ontario, Prince Edward Island.

*Diaspis Boisduvalii, Sign.	Ontario.
Chionaspis pinifolii, Fitch.	Ontario, Quebec, British Columbia.
" Lintneri, Comst.	Ontario, Quebec, Prince Edward Island, Nova Scotia.
" corni, Cooley.	Ontario.
" furfurus, Fitch.	Ontario, Quebec, Prince Edward Island, Nova Scotia.
" salicis-nigræ, Walsh.	Ontario.
Hemichionaspis aspidistræ, Sign.	Ontario.
Mytilaspis ulmi, L.	In all the provinces.

We have now 59 species of *Coccidæ* recorded from British North America; the two more, probably new, would make 61 species.

Distribution by provinces: Ontario has produced the largest portion, 48 species; Prince Edward Island and Nova Scotia with 13 each; Quebec next with 9; British Columbia with 6, and Manitoba, 5.

Ottawa seems to lead, with London next, and then Niagara and St. Catharines. Very few other places produce more than two or three species each, and many only one.

At present there are 37 native and 22 introduced species.

I shall be pleased to receive and determine any material in Coccidæ found in Canada. I would say in this connection that the last of May and June are the two best months to find the genus *Pulvinaria*, and collecting for other species can be done the year round.

BOOK NOTICE.

GENERA INSECTORUM.—Published by P. Wytsman, 108 Boulevard du Nord, Brussels, Belgium.

The third and fourth parts of this work have now been issued. Part 3 consists of 40 pages and one plate, and forms a monograph of the tribes and genera of the family *Lathridiidæ* (Coleoptera, Clavicornica): lists and bibliographical references of species are given. This is a very satisfactory study of these minute beetles by the Rev. R. P. Belon, of

*This was cited as an *Aulacaspis*, but Mr. Newstead has shown it to belong to *Diaspis*. (Ckll. in litt.)

Lyons, France, who, with Mr. Fall, of Pasadena, California, is one of the few living entomologists who is thoroughly familiar with this family of Coleoptera. He divides it into five tribes and 22 genera, and recognizes about 440 species; the plate, which is clearly executed, gives the characters of all the genera.

Part 4 contains only three pages and a plate, and gives a description and illustrations, by Mr. P. Wytsman, of the genus *Leptocircus*, which forms the subfamily Leptocircinæ of the Papilionidæ (Lepidoptera, Rhopalocera). The plate gives excellent figures of each of the six species of these beautiful Oriental butterflies, with the venation and other details.

These two parts are in French, but we were in error in stating in our notice of Part 1 that French was to be the language employed in the work. Each contributor will write in English, French or German, whichever may be most convenient to him.

Parts 5 and 6, which are about to be issued, will be devoted to the Lepidoptera. In the former, Dr. A. Pagenstecher takes up the Libytheidæ and divides the family into three genera, *Libythea*, *Hypatus* and *Dichora*. He recognizes only ten species, all the others being considered to be varieties. The text (four pages) will be illustrated with a beautiful coloured plate.

Part 6 will contain a very extended study of the Ornithopterinæ, the subfamily of the Papilionidæ which includes some of the most magnificent butterflies in the world, by Mr. Robert Rippon, of London, England, the author of the great work, "Icones Ornithopterorum." He has paid great attention to these "Butterflies of Paradise," as he calls them, and as the result of his studies divides the group into six genera: 1, *Drurya* (2 species); 2, *Schoenbergia* (4 sp. and 3 varieties); 3, *Ornithoptera* (11 sp. and 11 vars); 4, *Æetheoptera* (3 sp.); 5, *Trogonoptera* (2 sp); 6, *Pompeoptera* (24 sp. and 16 vars.). The part will be illustrated with two beautifully-coloured plates.

The plan adopted for this great work is certainly excellent, as each family, or subfamily, will be treated by the best specialist known, in whatever part of the world he may be. It is an immense undertaking, and the enterprising publisher should receive the support of all the important libraries in every country.

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CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, A. M., ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 6.—Continued from p. 137.)

Family XXVIII.—Vespidæ.

This family is restricted to the paper-making wasps, all social species living in large communities and having three distinct sexes, female, worker, and male, thus agreeing with the social bees, the *Apidæ* and *Bombidæ*, and with many ants, *Dorylidæ*, *Myrmicidæ*, *Formicidæ*, etc.

In some species, too, like the ants, there appear to be two forms of the worker.

Deceived by their habits, for structurally they are widely separated, Westwood and Packard thought the social wasps were allied to the *Apidæ*, and in their scheme of classification have placed them next to the bees, with which they have nothing in common.

Cresson, Kirby and most late writers seem to have followed them, but in my opinion it is clearly an unnatural position; they have no relationship whatever with the bees, and are a component of this great complex, but with affinities, through some exotic forms, allying them with the next great complex, or the superfamily Formicoidea.

Two very distinct groups, here called subfamilies, have been recognized. They were first correctly indicated by C. G. Thomson, the distinguished Swedish entomologist, who called them tribes.

Table of Subfamilies.

Hind wings entire, *without* an anal lobe, mesepisterna not separated ..... Subfamily I.—Vespinæ.

Hind wings *with* a distinct anal lobe; mesepisterna separated ..... Subfamily II.—Polistinæ.

SUBFAMILY I.—Vespinæ.

1874. Vespina, Tribus. Thomson, Skand. Hym., III., p. 6.

The absence of an anal lobe in the hind wings, and the non-separated mesepisternum, distinguish the group. The species, too, are much shorter, more robust, with a decidedly shorter mesonotum.

Paravespa, Radoszkowsky, described in 1886, I do not know, but have incorporated it from the description alone.

Three genera have been recognized, separable as follows:

Table of Genera.

First abdominal segment broadly truncate at base.
  Eyes not extending to the base of the mandibles ..... 2.
  Eyes extending to the base of the mandibles, or very nearly.
    Third cubital cell along the radius fully as long as along the cubitus ..... Vespa, Linné.
    (Type V. vulgaris, Linné.)
    Third cubital cell along the radius much shorter than along the cubitus ..... Paravespa, Radoszkowsky.
    (Type P. Komarowii, Radoszk.)
2. Third submarginal cell along the radius longer than along the cubitus, or about twice as long; clypeus longer than wide, sinuate or slightly emarginate anteriorly and semicircularly emarginate at sides anteriorly ..... Vespula, Thomson.
  (Type Vespa austriaca, Panzer.)

SUBFAMILY II.—Polistinæ.

1874. Polistina, Tribus. Thomson, Skand. Hym., III., p. 6.

In this subfamily the hind wings have an anal lobe, and the mesepisternum is separated.

The genera are numerous, and have reached their greatest development in tropical countries. The group is of great economic importance, as the various genera destroy the more destructive Lepidopterous larvæ.

Table of Genera.

Second cubital cell receiving both recurrent nervures ..... 2.
Second and third cubital cells each receiving a recurrent nervure.
  Second cubital cell petiolate; clypeus terminating in a tooth; mandibles short, acutely dentate at apex ..... Anthreneida, White.
  (Type Vespa Sumatræ, Weber.)

2. Abdomen petiolate; mandibles 2–4-dentate; maxillary palpi 5- or 6-jointed ..... 4.

Abdomen not petiolate.

Abdomen subsessile, the first segment campanulate ..... 3.

Abdomen sessile, the first segment very small, rounded above, the second very large, occupying most of the surface, the following being more or less retracted; second cubital cell wider than long; scutellum entirely covering the post-scutellum ..... Nectarinia, Shuckard.

(Type Brachygastra analis, Perty.)

3. Metathorax smooth or punctate; abdomen rather short, subovate or oval ..... Chartergus, Latreille.

(Type Vespa apicalis, Fabr.)

Metathorax transversely striate or aciculate; abdomen long, fusiform, or elongate ovate ..... Polistes, Latreille.

(Type Vespa biglumis, Linné.)

4. Front wings with *three* cubital cells ..... 5.

Front wings with *two* cubital cells ..... Paraicaria, Gribodo.

(Type P. bicolor, Gribodo.)

5. Abdomen with the first segment, or petiole, linear, the second segment more or less constricted or petiolate at base ..... 7.

Abdomen with the first segment, or petiole, clavate or subglobose at apex, the second segment normal, not constricted at base.

Second abdominal segment not especially large, not occupying most of the surface nor covering the third ..... 6.

Second abdominal segment very large, occupying most of the surface, and covering the third, the terminal segments more or less retracted; mandibles 4-dentate, the inner tooth the smallest; clypeus wider than long, slightly rounded or subtriangular anteriorly, but not dentate ..... Icaria, Saussure.

(Type I. artifex, Sauss.)

6. First abdominal segment subcampanulate; body of abdomen conical; prothorax narrowed, not margined above; temples as broad or a little broader than the width of the eyes ..... Synœca, Saussure.

(Type Vespa Surinama, Linné.)

First abdominal segment variable, sublinear or clavate; body of abdomen fusiform, clavate or subovate; prothorax short; temples

scarcely so broad as the width of the eyes; mandibles 4-dentate, the teeth subequal; clypeus angulate anteriorly.. Polybia, Lepeletier.
(Type Polistes liliacea, Fab.)

7. Body elongate, cylindrical, or fusiform, the abdominal petiole very long; mandibles 3- or 4-dentate..... .....8.
Body rather short, not elongate, the abdominal petiole not especially long; mandibles bidentate.
Body of abdomen rotund; eyes small, the malar space distinct. ....Gyrostoma, Kirby.
(Type Cyclostoma orientalis, Kirby.)
Body of abdomen short-ovate; eyes large, the malar space very small or linear..... .....Tatua Saussure.
(Type Vespa morio, Fabr.)

8. Body of abdomen fusiform, the second segment pedicellate.....9.
Body of abdomen elongate, cylindrical or nearly, the second segment *not* pedicellate and scarcely longer than the third.. Apoica, Lepeletier.
(Type Polistes virginea, Fabr.)

9. Second cubital cell trapezoidal, narrowed above; mandibles 4-dentate.
Clypeus short, angulate anteriorly; maxillary palpi 5-jointed.....Belonogaster, Saussure.
(Type Vespa grisea, Fabr.)
Clypeus anteriorly slightly emarginate and bidentate; maxillary palpi 6-jointed, the last joint the longest.....Mischocyttarus, Saussure.
(Type Zethus labiatus, Fabr.)
Second cubital cell triangular; mandibles 3-dentate; clypeus wider than long, subemarginate at apex; maxillary palpi 6-jointed, the first joint elongate, the last two small.....Paramischocyttarus, Magretti.
(Type P. subtilis, Magretti.)

ERRATA.

In Mr. G. B. King's paper on the "Coccidæ of British North America," in the June number, the following corrections should be made:

Page 159, for Ripersia *basi* read R. *lasii*.

Page 160, for Pulvinaria *brassicæ* read P. *brassiæ*.

Page 160, Aspidiotus Dearnessi, Ontario (London), is from Lake Huron, not London.

MR. GROTE'S CRITICISMS.

BY HENRY H. LYMAN, MONTREAL.

As Mr. Grote has done me the honour to make certain criticisms on some of my recent papers, I would ask space for a brief reply.

In regard to *Gortyna Ærata*, I have no doubt that it has an alternative food-plant, but possibly it may never be discovered. Mr. Bird has made the same point, that as burdock is an introduced species it could not be the original preferred food-plant of any American species. But, while I admit that an introduced species could not be the original food-plant of an American insect, I see no reason why it should not be the preferred food since its introduction, just as *Doryphora Decemlineata* prefers the potato to its original food-plant.

If the difference between *Nitela* and *Ærata* was not made sufficiently apparent in my description, it was because I never thought of the two being confused, as the difference in colour is so marked, while Dr. Dyar had, as stated, expressed the opinion that my specimen was only a variety of *Necopina*, and Mr. Bird, to whom I also showed it, never suggested any close relationship to *Nitela*, but said that if the larva proved to be distinct from that of *Necopina* I would be warranted in describing it as a new species, and I am quite sure that had I not bred the species no one would have believed that a flown specimen of it was anything but an example of *Necopina*.

In regard to the names *Nitela* and *Nebris*, I must confess that I was a little amused at being chided as too strict a stickler for the rigid enforcement of the law of priority, especially in view of the fact that I have already expressed the opinion that the law of priority should not be maintained in favour of the variety as against the prevailing form of the species*, but if I am going to extremes in carrying this law back two inches, and that is all the priority I claim for the name *Nebris*, what should be thought of Mr. Grote in carrying it back to primeval times, long before there was any entomologist to criticise his fellows, to say nothing of studying these creatures.

If, as conjectured by Mr. Grote, the form *Nitela* was the primitive form, and the form *Nebris* is a more specialized form which has been evolved from it, it would seem probable that in course of time the latter would become the dominant one, in spite of the varietal name which Mr.

*CAN. ENT., XXIX., 256.

Grote wishes to keep tied to it. Not only so, but if the tendencies which produced this form continued, the form *Vitela* might become extinct, and yet *Nebris* would only be var. *Nebris* of the extinct *Nitela*.

Surely we must classify species as we find them existing at present, and not on the basis of any man's conjecture of what they may have been hundreds of thousands of years ago. If the law of priority is to be carried back to primeval times, it will be invested with new terrors.

In regard to my remarks on *Lophodonta Angulosa* and *Lophodonta Georgica*, or, as Dr. Packard in his work on the Bombycine Moths gives them, *Lophodonta Angulosa* and *Drymonia Georgica*, I confess that I had overlooked the paper by Messrs. Grote and Robinson in the Annals of the N. Y. Lyceum N. Hist.

Of course, theoretically, anyone who ventures to write on any entomological subject is supposed to be acquainted with everything which has ever been published on that subject in his own country, and in every other country, but practically if we attempted to follow that rule, I am afraid that little, if anything, would be written. We have to take some chances, and a man away from large entomological libraries must depend to a certain extent upon catalogues and indexes, and in no record or catalogue which I possess is this paper referred to.

I am much obliged to Mr. Grote for calling my attention to it, and may point out that the authors fell into the error of giving the number of Abbot & Smith's plate as 78 instead of 83, as given by me.

I disagree with those gentlemen, however, in their conclusions, as there is not a particle of evidence pointing to the probability of the "lower right-hand figure" of Abbot's plate being a male. It was figured as a female, and presumably belonged to that sex. It is, of course, possible that Abbot may have been mistaken, and it may have been a male, just as he figured a small female of *Phobetron Pithecium* as the male of that species, a not very heinous error when the extremely aberrant character of the male is considered, but even if it was a male, I fail to see that that would make any difference. The upper left-hand figure was the one described as the typical form, it being distinctly stated that the males and the majority of the females were of that type, while the lower right-hand figure was given merely as a variety of colour.

Mr. Grote says that Abbot & Smith's name became restricted to this supposed "variety of colour" by Herrick-Schaffer's description of *Georgica*, but he did not describe it; he merely published a figure, a

much better one, it is true, than Abbot's, and put down the name in the various lists given in the work, thus :

Page 11. Notodonta Georgica—angulosa, Abbot.

Page 66. Notodonta O.
angulosa Abbot — georgica, H.-S., fig. 384 — Georg. Am.

Page 82. No. 384, Notodonta georgica, H.-S., foem.— Notodonta angulosa, Abbot.

So far as I have been able to make out, it was merely a substitution of the name *Georgica* by Herrick-Schaffer for the name *Angulosa* proposed by Sir J. E. Smith, in much the same way as the latter tried to substitute the name *Sphinx Chionanthi*, A. & S., for *Sphinx Rustica*, Fabr., and I hold that if he recognized that Abbot had figured two species on that plate, he should have given his new name to the species represented by the lower right-hand figure.

A NEW SPECIES OF MELANOPLUS FROM ARIZONA.

BY A. N. CAUDELL, WASHINGTON, D. C.

Melanoplus Brownii, sp. nov.—General colour brownish fuscous. Head slightly prominent, with the occiput elevated a little above the pronotum and with a black postocular stripe ; interspace between the eyes no broader than the basal segment of the antennæ ; fastigium moderately declivent and deeply sulcate, especially in the male ; frontal costa percurrent and deeply sulcate except above, where it is biseriately punctate. Eyes large and somewhat prominent, distinctly longer than the infraocular portion of the genæ. Antennæ long, in the male as long or longer than the posterior femora. Pronotum equal in the anterior portion, but quite noticeably expanding on the metazona, truncate anteriorly, posteriorly obtuse angulate, the angle rounded ; lateral lobes marked with a more or less interrupted black stripe which is continuous with the postocular stripe of the head. Median carina distinct only on the metazona, which is shorter than the prozona. Prosternal spine suberect, pyramidal, apically acuminate. Interspace between the mesosternal lobes longer than broad ; metasternal lobes subattingent. Elytra long and slender, extending far beyond the hind femora in both sexes, almost

immaculate. Hind femora moderately slender, uniformly brownish, often darker above and externally and sometimes with slight fuscous genicular markings. Hind tibiæ yellowish brown, the spines tipped with black, ten to eleven in the outer series. Extremity of male abdomen neither swollen nor upturned. Furcula broad as in the other members of the group to which this species belongs; cerci shaped very much the same as those of *M. Bowditchi*, somewhat incurved and externally sulcate at the tip, sometimes very inconspicuously so. Subgenital plate long, apically narrow.

Length: elytra, male 18.5 to 19.5 mm., female 23 to 24 mm.; hind femora, male 10.5 to 11 mm., female 13 to 14 mm.

Three males, three females, Yuma, Arizona.

Type No. 6302, U. S. Nat. Mus.

These specimens were sent to the Department of Agriculture by the collector, Mr. Herbert Brown, superintendent of the territorial prison at Yuma, Arizona. They were collected on December 8th, 1901, a few miles from Yuma, up the Colorado River, at the head of a dry slough. They belong to the *Bowditchi* series, and the species is most nearly allied to *M. pictus*, from which it is readily distinguished, however, by the differently-shaped cerci and the smaller size.

ACKNOWLEDGMENTS.

On the 26th of May, 1902, I received from Mr. C. G. Anderson, London, a freshly-emerged specimen of *Papilio Ajax* (spring form, *Telamonides*, Feld.), taken by him at Kingsville on the 24th—another testimony to the southern character of the flora and fauna of Lake Erie's northern shore.

I desire to give expression to my pleasure in receiving from Mr. J. A. Morden, London, Ont., twenty-four specimens of that rarely-observed beetle, *Cyllene pictus*, Drury, which he secured for me out of a stick of bitter-nut hickory in the first week of May, 1902.

J. Alston Moffat.

NEW GENERA AND SPECIES OF ACARIANS.

BY NATHAN BANKS, EAST END, VA.

In the following pages I have included descriptions of a few new genera and species of mites that have been in my possession for some time. Several of the genera are for the first time recorded in America. A note is added on two species of *Trichotarsus*. Of the two new genera, the *Liroaspis* is a very remarkable form, and finds its nearest allies in certain tropical species.

Trombidium granulatum, n. sp.—Bright blood red, the legs are clothed with scale-like hairs, those on the basal joints are white, elsewhere they are red, except on the apical joint of leg I., which is mostly white; the palpi and mouth-parts are mostly white, but reddish toward the tip. The body is covered above with rounded elevated granules, subequal in size and height; on the under side they are more scarce and there are some short red hairs. The body is hardly twice as long as broad, broadest at humeri, slightly constricted over base of the third legs, and broadly rounded behind; the dorsal outline at juncture of head and abdomen shows very little depression; on the cephalic part there is a median grove, and each side are two sessile eyes. The legs are short and stout, the last joint of leg I. is somewhat swollen, and plainly longer than the preceding joint; on the median joints of legs I. and II. there are above smooth stripes, where there are few hairs. The hind legs reach considerably beyond end of abdomen, the last joint is not swollen and is about equal to the penultimate. The genital opening is circular, and pale; the anal opening is elongate. The palpi are short, the second joint much swollen; the thumb is clavate, and barely passes the stout claw. Length, 1.8 mm.

A few specimens from Ft. Lee, New Jersey. This species, by its granular covering, is closely allied to the European *T. sanguineum*, Koch. In that species, however, the thumb of palpus is not clavate, but pointed, the last joint of leg I. is more swollen, the hind legs are rather shorter, and the bases of the legs are not pale in colour.

Ammonia Americana, n. sp. (Fig. 5).—Rather brownish yellow, with a red mark each side (in alcohol these are lost), and a reddish stripe behind, legs and palpi paler. The mandibles are short, less than the length of the cephalothorax, with two bristles each side; palpi short, second joint about three times as long as broad, third indistinctly separated from the second, about as long as broad, fourth scarcely longer

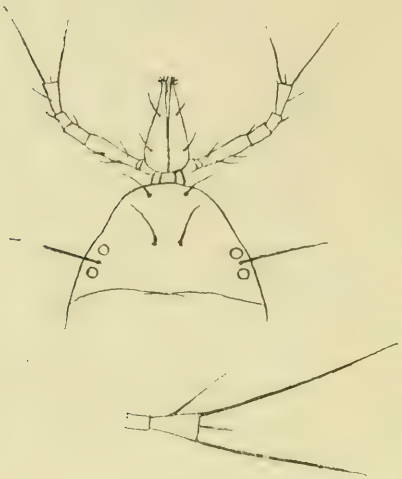

Fig. 5.

than broad, fifth about one and one-half times as long as broad at tip, with two long hairs at tip, the outer one more than twice as long as joint; body almost twice as long as broad, sides (beyond eyes) sub-parallel, broadly rounded behind; two eyes each side, and near them a long seta; two setæ in front and two on middle of the cephalothorax; on anterior margin of the cephalothorax is a single black quadrangular mark with a white circle in it. Length, .75 mm. Washington, D. C. (March.)

Specimens were taken on wet ground under stones and among short grass; it is the first species of the genus that I have seen from America.

Notophallus dorsalis, n. sp.—Black; legs red; a large elongate red spot on the posterior median dorsum, containing the anal opening; a large eye each side on the anterior portion; some scattered short hairs above. Legs short, first pair scarcely longer than the body, fourth pair shorter than the body. Genital opening large, elliptical, divided longitudinally; palpi short, red. Length, .8 mm.

A few specimens taken at Washington, D. C., in the early spring; on ground under stones and sticks. It is the first record of the genus in this country; a genus differing from all our other Eupodidæ in having the anal opening on the dorsum.

Cheyletus clavispinus, n. sp.—Body pale reddish or yellowish, fading out in alcohol. Body somewhat quadrangular, corners rounded, about

one-fourth longer than broad; above on each side with two rows of about seven or eight long clavate and finely serrate bristles, one row is lateral, and one submedian; at the tip there are two long bristles and two shorter intermediate ones; the palpi are short and stout, outwardly geniculate, bearing above two prominent clavate hairs, last joint with a slender curved claw and with the usual serrate organ; first legs as long as body, tarsus slender, tipped with two hairs longer than the joint itself, penultimate joint with two clavate hairs above and two moderately long simple hairs at the tip; a few clavate hairs on the other joints; other legs with a few clavate hairs on the joints except the tarsi; fourth legs about as long as the body; venter with a few scattered simple hairs. Length, .6 mm.

Specimens were received from Dr. Blatchley, who took them from beneath the wings of an *Aradus* found near Indianapolis, Indiana. A European species has also been recorded as found on *Aradus;* but it is different from ours.

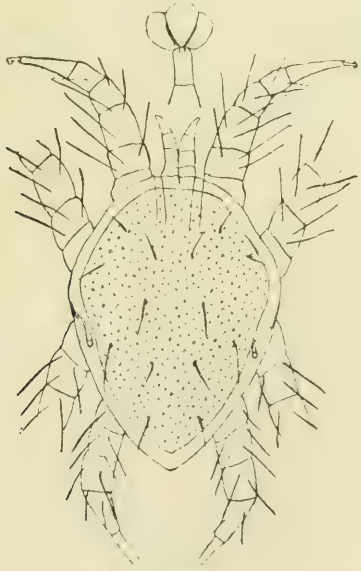

Fig. 6.

Pteroptus Americanus, n. sp. (Fig. 6).—Pale yellowish. Body about one and one-half times as long as broad; truncate in front, broadest just behind the second pair of legs, thence tapering to an almost acute tip; shield nearly as large as the dorsum, leaving a narrow margin all around, broader on the sides than in front; peritreme situate over the third coxæ,

arcuate; dorsal shield plainly granulate, and provided with a few scattered, short hairs; legs short and heavy, with rather long tarsi, terminating in the usual two claws and swollen pad, the basal joints with a number of stout bristles, most of them longer than the diameter of the joints. Palpi quite long, divergent. On the front of the body are seen four parallel lines, reaching back a short distance. Length, 1 mm.

From a bat in a cave in Indiana (Blatchley). Nearest to *P. euryalis* of Europe, but with a longer body, more granulate shield, and more slender tarsi. The truncate anterior margin is also peculiar. This is, I believe, the first time the genus has been recorded from this country.

Liroaspis, n. gen.—A Gamasid, probably related to *Lercon*. The genital opening is in front of sternal plate; the dorsal shield is divided into six pieces, a large piece in front, a smaller piece near tip, and four small median pieces arranged in a quadrangle. The claws are all very weak, especially so in the front legs. The peritreme runs along above the coxæ for a considerable distance. The body is broad, and rather flat; behind emarginate and tipped with four spine-like bristles. The anal opening is small and near tip of body. Type *L. Americana*, n. sp.

I also refer to this genus the *Seius acanthurus*, Can., described from Australia, and also recorded from Italy. Berlese puts it in *Lercon*, which, however, is distinct by the short peritreme, etc.

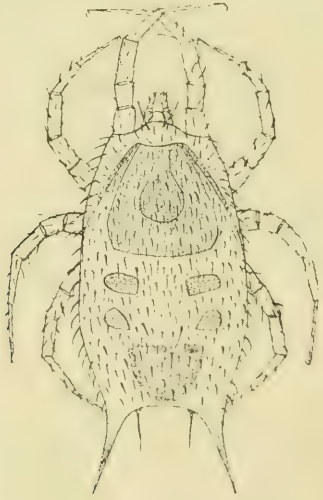

Fig. 7.

Liroaspis Americana, n. sp. (Fig. 7).—Yellowish throughout. Body a little more than one and one-half times as long as broad, about as broad

in front as behind, broadest in middle, sides evenly convex, each posterior angle prolonged into a spinelike process tipped with a long stout bristle. They are slightly divergent, and between them are two long stout bristles arising f om the hind edge of the body. The anterior margin of the body is rounded, and prominent in the middle, and bears two submedian bristles. The dorsal surface of the body is scantily clothed with short curved bristles, and there is a row of bristles along each side-margin. There are six shields on the dorsum; in front is a large trapezoidal piece containing a paler central figure, from the anterior angle of this trapezoid a curved line extends backward and reaches the side-margin before the middle. Behind this large piece are four submedian pieces, the anterior pair longer than the posterior pair, and fully their diameter apart. Behind there is a median semicircular piece, the convexity behind. The legs are all shorter than the body and with many bristles. Length, 1.5 mm.

Specimens from Olympia, Washington, and from St. Croix Falls, Wisconsin. A remarkable and interesting species, evidently confined to northern localities.

Hoploderma granulata, n. sp.—Pale yellowish brown. Dorsum as high as broad, evenly convex above; about one and two-thirds times as long as broad, broadly rounded in front and behind, broadest in middle, its surface quite coarsely but evenly granulate, and provided with about twenty erect bristles, mostly situate around the margin, nearly all rather thick and blunt-pointed. Cephalothorax about once and one third longer than broad, broadly rounded in front, finely granulate and with two long superior bristles. Ventral openings subequal in size, each about as broad as long; the anal one slightly indented behind; setæ quite long arcuate. Length, .6 mm.

Three specimens from Ottawa, Canada (Harrington). Distinct by elongate form and granulate dorsum.

Gymnobates, n. gen.—Tarsi with three equal claws; abdomen provided with wings, with an extension forward over the basal part of the cephalothorax. Tarsi broad at tips. Setæ short, capitate. The coxæ marginal. Sternum divided by two transverse lines. Ventral openings far apart. Type *G. glaber*.

Differs from *Oribates* in the tarsi being broad at tip, and the abdomen extending over the cephalothorax.

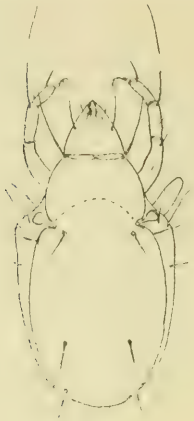

FIG. 8.

Gymnobates glaber, n. sp. (Fig. 8).—Pale yellowish brown. Cephalothorax smooth; about twice as long as broad, tapering in front, its basal half covered by an extension of the dorsum of abdomen; from each anterior corner of this extension is a long, stout bristle; on the cephalothorax toward tip is a bristle each side. Abdomen smooth; exclusive of wings, it is about one and three-fourths times as long as broad, broadly rounded behind; with six bristles above, two at base, two toward tip, and two on hind margin. On each side of dorsum is a slender wing, broadest in front, with four or five bristles above, three of them in front. Setæ short, capitate. Legs rather short, the second pair largest, joints sub-fusiform, tarsi broad at tip, the tibia with a long hair at tip above. A lamella behind coxa I. Genital opening nearly circular, nearly twice its diameter from the much larger anal opening, the latter sub-elliptical and emarginate in front. Length, .45 mm.

One specimen taken from a dry gall, at Washington, D. C.

Trichotarsus osmiæ, Dufour.—I have taken specimens of a species of *Trichotarsus* from a species of *Osmia*, at Sea Cliff, N. Y., which appears to agree in all particulars with this European species. It is, of course, possible that when the adult females of these forms are known, they may present differences. This species differs from the more common *T. xylocopæ* in having two claws at tips of tarsi I., II. and III

Trichotarsus xylocopa, Dufour.—Prof. H. Osborn has recorded this species as taken from a Californian *Xylocopa*, and sent him by Mr. Coquillett. It is a common European species.

ON THE GENUS LECANIUM.

BY MRS. C. H. FERNALD, AMHERST, MASS.

In the preparation of my Catalogue of the Coccidæ I was not able to find where Illiger had proposed or described the genus *Lecanium*, although Burmeister in his Handbook of Entomology, Vol. II., p. 69 (1835), used this genus, giving Illiger as the authority. Burmeister described the genus and placed under it *hesperidum*, Linn., and several other species. My husband, Prof. C. H. Fernald, wrote to Mr. Theodore Pergande, inquiring if he could give me any information whether Illiger had really published this genus, and if so where it could be found. Mr. Pergande has sent the following letter in reply, and has consented to have it published :

"My dear Professor,—In accordance with my promise of December 9, 1901, regarding the authority for the genus *Lecanium*, I wrote to Dr. K. Mobius, Director of the Zoological Museum of Berlin, Germany, for information on this point, and received lately from Dr. Th. Kuhlgatz, Assistant in the Museum, the following answer :

"'In answer to your request, I inform you herewith that the generic name *Lecanium*, Illiger, in Burmeister's Handbook, Vol. II., was doubtless the first publication of this name ; a name which Illiger, prior to Burmeister's publication, had either written on some label or used in some manuscript which was never published.

"'At any rate, I have failed to find anything in the literature pertaining to this genus, which would justify us to accept Illiger as the author.

"' I wish to call your attention to the fact that Burmeister frequently credited the authorship for specimens to someone else, notwithstanding that the first publication of such species was made by himself.

"'For instance, he credited the authorship of *Colobatristes macronatus*, Handbuch II., p. 325, which was described by him for the first time, not to himself, but to Klug. The label of the type in the Berlin Museum explains it fully. The label shows neither the name of Burmeister nor of Klug, as being the author, but simply "N," behind the name of the

species. "N" means simply, "Nomen in litteris," which Klug himself added to the specific name, to indicate that thus far this name was only used privately and did not yet exist in print. Burmeister adopted this name later for this species and described it for the first time, retaining the manuscript name and cited Klug as the author, though surely wrongly, of which Burmeister, as is universally acknowledged, is the author.

"'As far as I have been able to see, the original label for the genus *Lecanium* has not been preserved in the Berlin Museum.'

"In the hope that this communication will straighten the matter, I remain, Most sincerely yours,

"THEO. PERGANDE."

Dr. O. G. Costa published his Nuove Osservazioni intorno alle Cocciniglie in the Atti del R. Instit. d'Incorrag., Vol. VI., pp. 31–52. This volume bears the date 1840 on the title page, but as Vol. V. is dated 1834, and as the separatum, which is exactly like the above-named paper except in pagination, bears the date 1835, it is quite certain that the first part of Vol. VI. was also published in 1835. Dr. Hagen was in error in giving 1828 as the date of this paper.

Costa in his Fauna del Regno di Napoli Emitteri divides the Coccidæ into three genera, as follows: Genus *Calypticus* with *hesperidum*, Linn., and *spumosus*, *lævis*, *aterrimus*, *radiatus*, *testudineus* and *fasciatus* of Costa. The first species, *hesperidum*, Linn., may be regarded as the type.

There is some doubt as to the exact date of publication of the Coccidæ in this work, but Hagen gives the date of the entire work 1832–1858. The Coccidæ of the Fauna is referred to in the Nuove Osservazioni, several times in such a way as to lead me to believe that it was published before 1835, and therefore *Lecanium*, which dates only from 1835, is preoccupied by *Calypticus*, Costa.

There is another work by Costa which I have not yet been able to see. This is his Prospetti di una nuova descrizione metodica del genera Coccus L., published in Naples in 1828. From a reference to this in the Fauna del Regno di Napoli, I infer that he proposed generic names which he changed in his later works. Whether these names were established in such a way that they may be used to the exclusion of the later ones, I have not yet been able to learn.

A RECENTLY DISCOVERED GENUS AND SPECIES OF AQUATIC HYMENOPTERA.

BY J. CHESTER BRADLEY, PHILADELPHIA, PA.

In the Annales Soc. Ent. de France, LXIX., p. 171, P. Marchal publishes an article entitled "Sur un nouvel Hyménoptère aquatique, le *Limnodytes gerriphagus*, n. gen., n. sp."

Mr. Marchal is to be complimented on his discovery and observation of the habits of this very interesting insect, but it is deeply to be regretted that the generic name which he has chosen is preoccupied, hence it becomes necessary to change it, and desirable to do so at once, before it becomes widely known. The name *Limnodytes* was employed by Dumeril and Bibron in their "Erpétologie générale," Vol. VIII., 1841, p. 510, for a genus of salamanders, hence I propose in its place the term TIPHODYTES, nov. name.

In this connection I may apropos make a few remarks, gathered from Marchal's paper, concerning the habits and relations of this insect.

Metchnikoff, and after him Ganin, mentioned finding an unknown species of *Teleas* as a parasite on the eggs of *Gerris* (Hemiptera-Heteroptera). Marchal found the present species during the month of May, in the pond of Trivaux, Meudon, near Paris, also parasitizing the eggs of *Gerris*, but he considers it distinct, although closely related to the one found by Metchnikoff and Ganin. On the 12th of May he collected eggs which were animated with the larvæ of the parasite. These eggs were always arranged along the lower surface of Potamogeton leaves. The larvæ differed from those figured by Ganin in the arrangement of the hair and brevity of the caudal cornus. In June, four female and two male adults hatched, and these used their wings for swimming in any direction through the water, with a leisurely movement. When they came to the surface they had to make an effort to pass through it into the air, where they readily took flight. Likewise, in entering the water the insect bent its head forward and made a visible effort to conquer the resistance offered by the surface film, unless it entered on the edge of a projecting leaf or twig.

My excuse for entering at length here into an abstract and discussion of Marchal's article is because aquatic examples of the Hymenoptera are very few, and the fact that winged adults of such an order should enter and swim in the water must interest many entomologists who will never see the original article.

Amongst those already known may be mentioned *Agriotypus armatus*, Walker, which is confined (as are the others) to the European fauna, and has been observed swimming beneath the water, being parasitic on the larvæ of various Trichoptera. It forms a family of its own, probably related most closely to the Ichneumonidæ. *Polynema natans* belongs to the Mymarinæ (Proctotrypidæ), and resembles in method of swimming Marchal's species, but its wings are somewhat abortive, and it is thought that it cannot fly well. It is parasitic on the eggs of *Calopteryx*. Lastly, *Prestivichia aquatica*, said to be a Chalcid, is parasitic on the eggs of Notonectus and Dytiscus, as observed by Lubbock and Enoch, and swims with its legs instead of its wings.

Marchal places his genus within the Proctotrypidæ, subfamily Scelioninæ, close to the genus *Thoron*. For its characters I must refer the reader to the original memoir.

So far as I know, aquatic Hymenoptera are as yet unknown to the American fauna. But there should be—at least, it is quite likely that there may be—some species which has adopted an aquatic life here as well as in Europe. Who will be the first to find one?

TWO NEW SILPHIDÆ FROM COLORADO.

BY H. F. WICKHAM, IOWA CITY, IOWA.

Silpha Coloradensis, n. sp.—Form of *inæqualis*, but more elongate, black, except the tip of the abdomen, which is orange-rufous; above clothed with short black hairs. Head densely punctate, the punctures regular over the greater part of the surface, those in front of the inter-antennal line smaller and less distinct; occipital transverse impression deep; labrum short, broadly emarginate; antennæ black, club four-jointed, the last three joints pubescent, the terminal one longer, compressed, tip sinuately rounded. Thorax about one and one-half times as broad as long, narrowed anteriorly, sides broadly arcuate in front, more suddenly so behind, basal lobe slightly and very broadly emarginate. Surface somewhat irregular, densely and very regularly punctate, sides somewhat flattened. Scutellum slightly concave, densely punctured. Elytra as wide as the thorax and fully twice as long, the sides nearly parallel, outer margins distinctly reflexed, apices conjointly rounded, but sinuate externally, punctuation less dense than that of the thorax, each puncture with a recumbent hair. Disk flat, more suddenly declivous at sides than in *inæqualis*, each elytron with three costæ, the outer of which is much the best marked, being high, acute, not terminating opposite the

tuberosity, but suddenly bent inward at this point; the middle costa passes through the tuberosity, is almost obliterated except at tip, and very nearly reaches the apical margin: the inner costa distinct only near the tip, also nearly attaining the apex: tuberosity high. Body beneath shining, scabro-punctate, hairy, the hairs longer and paler on the metathorax sclerites, those on the last two abdominal segments and on the hind margin of the one preceding, orange. Length from anterior margin of thorax to apex of elytra, 11 mm.

The type is a male from the vicinity of the Argentine Pass, near Georgetown, Colorado, having been taken at an altitude of over 12,000 feet. The anterior tarsi are moderately broadly dilated, while the hind tibiæ are straight and without hook at tip. It may possibly be a subspecies of *tritubercula*, to which it is evidently more closely allied than to any other species in our fauna.

Colon Liebecki, n. sp.—Oval, more pointed behind, moderately convex, brown, elytra and under surface paler, legs and base of antennæ rufous; pubescence yellowish, not obscuring the surface colour. Head cribrately punctured, each puncture bearing a hair. Antennal club five-jointed, brownish, the last four joints very broad; scape rufous. Prothorax broadest a little in front of the base, narrowed to apex, sides arcuate, hind angles quite broadly rounded, surface finely punctured, pubescent. Elytra a trifle narrower than the thorax, broadest in front of the middle, gently narrowed behind, the sides slightly arcuate, punctuation about as on thorax, sutural stria entire but faint. Under surface of body moderately punctured, pubescent. Length, 1.8 mm.

Fig. 9.

In the male, the anterior tibiæ are arcuate, the outline of the inner edge might almost be called sub-angulate (see figure 9), the front tarsi are moderately dilated, the middle and hind tibiæ straight, the posterior femora with a small tooth near the middle; in the female the tarsi are not dilated, the tibiæ straight and the hind femora without tooth.

Collected at Breckenridge, Colorado, in July. This species seems most closely related to *C. dentatum*, Lec., but is distinct by the male characters.

NOTE ON THE LARVÆ OF *PENTHINA HEBESANA*, WALK.

BY ARTHUR GIBSON, OTTAWA.

During the winter of 1900–1901 the larvæ of this pretty Grapholithid were rather abundant at Ottawa, hibernating in the heads of mullein (*Verbascum thapsus*). Full-grown specimens were collected by the writer and Mr. C. H. Young in April, which pupated in the office on and about the 25th April, the first moths appearing on the 11th May, and the last specimen emerging on the 22nd May.

These larvæ were found in the seed-pods, and had been feeding on the seeds; numbers were present in the same head. As far as the writer knows, this is the first record, at least in Canada, of the caterpillars feeding on mullein. Dr. Howard writes that Mr. Coquillett has reared the species from *Stachys palustris*, and Mr. Chittenden from a species of flag. He adds: "It evidently has several food-plants, and sometimes it does injury to plants after they have been pressed for the herbarium."

When mature the larva is 8.5 mm. in length, at rest; when extended, 10.5 mm. The head is 1.0 mm. wide, jet black, smaller than segment 2, rounded, flattened in front, furrowed at apex; clypeus high; setæ pale, darkened towards base, some of the hairs long and some short; mouth-parts brownish; antennæ pale, darkened towards tips, pale at tips. Cervical shield shiny, not so black as head, anterior portion slightly reddish, the whole divided by a pale line. Body plump, cylindrical, dull copper colour, with a faint dark dorsal stripe. Skin finely pitted. Spiracles inconspicuous, ringed with black. Each segment has one distinct crease. Tubercles rather faint, same colour as body, setæ pale; hair from tubercle i. short, from ii. long; tubercle i. anterior to ii., iii. in a line with ii. Anal plate blackish. Thoracic feet shiny jet black; prolegs concolorous with body.

On the 24th March, 1902, two larvæ were found in the seed-pods of the above plant, but neither of these showed any trace of a dorsal stripe, and their colour was more of a dull red, not so bright as those from which the above description was taken. These two specimens were inside a thin cocoon of white silk, where they were doubtless awaiting the return of warm weather before pupating. More larvæ were collected early in May, one of which was of a dull greenish shade, with the faint dark dorsal stripe, hardly traceable on some segments.

I am indebted, through Dr. Fletcher, to Dr. Dyar for the determination of this species.

SOME GALL-INSECTS.

BY T. D. A. COCKERELL, EAST LAS VEGAS, N. M.

Cynipidæ.

Holcaspis Arizonica, n. sp. — Gall globular, 9 mm. diam., pale ochreous, not shiny, attached to the base of the petiole of a leaf of *Quercus Arizonica*, Sargent. There is a projecting point next to the place of insertion. Within, the gall is brown, fibrous, moderately dense, at least dithalamous.

Fly emerging April 19, two females. Body 3½ mm. long, wings 3⅔ mm.; antennæ 2 mm., 15-jointed, joint 3 considerably the longest. Length of joints in μ: (3.) 360, (4.) 240, (5.) 200, (15.) 170. The joints, especially the apical ones, with fine longitudinal ridges, between which are rows of minute punctures. Head ferruginous; thorax and abdomen piceous; margins of mesothorax, and two spots on scutellum, dull ferruginous; legs bright ferruginous; anterior tibiæ with an apical projection; anterior tibial spurs bent; claws of all the legs falciform, with a large triangular basal tooth. Outer parapsidal grooves failing anteriorly. Scutellum a large rounded hairy eminence, without grooves. Sides of thorax, and abdomen except upper basal portion, with much glittering white hair. Abdomen with a short ferruginous hairy projection beneath; ovipositor not visible. Naked portion of abdomen smooth and polished, hairy portion minutely tessellate, with a tendency to oblique grooves, only visible with a compound microscope. Wings strongly clouded on apical half, nervures piceous, areolet present.

Hab.—Prescott, Arizona, 1902. Collected by the writer. Closely related to *Cynips sulcatus*, Ashmead, but differs by its much darker colour and infuscated wings. It seems to go best in *Holcaspis*.

Cecidomyiidæ.

Lasioptera carbonitens, n. sp.—Gall shaped something like a long onion bulb, consisting of an aborted shoot of a grass not identified. The gall is entirely similar to that on *Brachypodium silvaticum*, figured by Rübsaamen in *Ent. Nach.*, XXI. (1895), p. 16. Fly emerged April 21.

♀. Shining coal-black; red patches at bases of wings; bases of all the femora, but especially the hind ones, pallid with a reddish tint; halteres pale reddish, shining; head small; antennæ short, 2 + 16 jointed; abdomen wholly without spots; ovipositor retractile; wings hyaline, iridescent, with black hairs and heavily-scaled black margins; closed wings reaching about to end of abdomen. Length a little over 2 mm., wings 1½ mm.

Hab.—Las Valles, N. M., near the Gallinas River, 1902.

Lasioptera ephedricola, n. sp.—Gall a resinous elongate lateral brown swelling of a twig of *Ephedra trifurca*. Flies emerge second week of March.

♂. Similar to *L. ephedræ*, but abdomen with basal and apical white bands on the fifth segment, but otherwise hardly banded. Legs dark brown. Costa without a white spot. ♀. Costa black, with a white mark; thorax with three black vittæ joined in front; abdomen with ten white spots. Antennæ: ♂, 2 + 18 jointed; ♀, 2 + 20 jointed.

The anchor-process of the larva resembles that figured by Rübsaamen, in Bull. Soc. Nat., Moscow, 1895, Plate XVI., Fig. 25, but it differs in detail, being broader and shorter, with the two processes of the head only about half as long, and at least twice as far apart. The sides of the head are also much more bulging. (The anchor-process of *Lasioptera Willistoni* differs from both of these in having a large quadrate elevation between the processes.)

Hab.—Mesilla Park, N. M., 1900.

Cecidomyia, n. sp.—Galls on *Lycium Torreyi*. ♀. Eyes united on vertex; antennæ 2 + 15 jointed; head and thoracic dorsum very dark brown, abdomen mostly crimson; legs and antennæ very dark brown. Mesilla Park, N. M.

Cecidomyia, n. sp.—In dry stems of *Amarantus Palmeri*, not forming a distinct gall. Larva orange; anchor-process with the head terminating in two large sharp teeth, and the sides of the head produced into long sharp teeth. Adult unknown. Mesilla Park, N. M.

BOOK NOTICE.

Fossile Schmetterlinge und der Schmetterlingsflugel, by A. Radcliffe Grote. Verhandl. der K. K. Zool.-bot. Gesellschaft in Wien, Heft 9, Jahrgang, 1901. With figure in text.

The author alludes to a general difficulty in tracing descent, arising out of the movements of animals. The butterflies had a special cause for such shifting of territory at the time of the glacial epochs; as previously shown by the author before the Am. Ass. Adv. Sci. in 1875, the effect of these migrations may be traced in the geographical distribution of *Œneis semidea* at the present time. Not only the obscurity of the fossil remains of Lepidoptera, but a want of detailed knowledge of the neuration itself, made the earlier determinations uncertain; the wings are often the best preserved portions of fossil specimens and thus the importance of their close study becomes obvious. The author recapitulates his

principal results in the specialization of the lepidopterous wing (1896–1900) and claims that by applying these tests in connection with the zoological principle of convergence (previously very generally neglected by writers on the Lepidoptera) he has been able to give a clearer picture of the development of the butterflies and a firmer, more natural classification than any offered by others. The preface to the new Palearctic Catalogue, by Staudinger and Rebel, recognizes this fact, saying that "for the retention of the Papilionids at the beginning of the Rhopalocera, and for the arrangement of this group altogether, Grote's recent phylogenetic studies are authoritative" (l. c., p. X.). By showing from his wing-studies, a parallelism in development of the two main lines he separates in the butterflies, the author believes he has terminated the controversy as to whether the Papilionids or Nymphalids are "highest." In demonstrating that the *Papilionides* are a closed, the *Hesperiades* an open, group to the moths, the sequences adopted among others by Hübner, H.-S., Meyrick, Hampson, Scudder, Reuter and the Philadelphia List* are invalidated. We were, indeed, "familiar," as recently stated in print, with the commencement by *Papilio* in catalogues, as well as in works of Linné, Fabricius, Boisduval, W. H. Edwards, etc., but we were *not* previously "familiar" with its proper reason, which it is the aim of science to expose. It will be more correct, however, in future to inaugurate the Papilionid series with *Parnassius*, this showing the most specialized structure. The Papilionid forms which mimic Nymphalids, and they are many, are younger than the forms they copy.

The author has shown that in the Pieri-Nymphalid stem, the Pierids are the ascending and neurationally more advanced group, while in the Lycæni-Hesperids, belonging to the same main line, the Blues take up the corresponding position. A synthetic type has been detected by the author in *Nemeobius*, proving the identity of the line itself. In the first main line, that of the Papilionides, the Parnassians are the more advanced and presumably the more modern group, while *Ornithoptera*, contrary to received opinion, has proved to be the more generalized form (cf. Proc. Am. Phil. Soc., Oct., 1899). The present paper under review elucidates some discrepancies in nomenclature between the new Catalogue and the final results of the author on the classification of the butterflies as

*"Dr. Skinner has placed the Nymphalidæ at the head of the Rhopalocera, and, in my opinion, correctly so."—Ed. Phil. Check List. The list commences with the Limnads, which are generalized forms, of which fact neither Dr. Skinner or the editor seem to have been aware.

given in the second part of the Syst. Lep. Hild., published April 19, 1900. It is probable that but for these publications the new Catalogue would have begun with the Nymphalidæ.

A discussion of the homology of the second radial branch in the Pierids with reduced radius follows the author's expressed preference for the amended Redtenbacher-Comstock system of notation for the veins. According to Spuler, the second radial branch in *Pieris* should be notated $2+3$, but a fusion of these branches is not demonstrated in the pupal wing. Grote's theory of the movement of the radial branches is, that they pass off by the tip of the wing. This is true especially for 2 to 5. Now, in *Pieris* the second radial remains in its original generalized position, near R1, above the cell. It does not seem probable that R3 could ever move backwards to fuse with R2. The reduced radius of *Pieris* receives compensatory mechananical support through the advance here of the first median branch from below. In the Nymphalids, where the radius is never reduced and remains in a generalized five-branched condition, the upward movement of the median branches is stayed.

The paper closes with a brief summary of the fossil remains of Lepidoptera published. These remains, though too few to be decisive, favour the author's view, as to the butterflies, that the Nymphalids and Hesperians represent older groups of the line to which they belong. The nearer relation between the two has been made evident by the author's discovery of the "long fork" in *Charaxes* (c. f. Proc. Am. Phil. Soc., 1898, 39), which indicates the way in which a wing of the Hesperid type may have passed into one of the type of wing shown by the brush-footed butterflies. A resemblance is shown also in the generalized radius and the consequent unwillingness of the median branches to leave the cross-vein. All these observations tend to support a mechanical source for the changes in the neuration.

The author considers the Lepidoptera to be a relatively younger branch of the insects. The possible conclusion to be drawn from their fossil remains is, that from Tineid-like forms existing in the middle period of the earth's history there was a rapid development in the Tertiaries, where we meet with butterflies already quite like the Nymphalids and Skippers of the present day. The meagreness of the material precludes the formation of any final opinion.—*Communicated.*

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WHAT IS A GENUS?*

BY HENRY H. LYMAN, MONTREAL.

This question is one that it is extremely difficult to answer satisfactorily.

The great naturalist, Agassiz, in his Essay on Classification, wrote: "Genera are most closely allied groups of animals differing * * * * simply in the ultimate structural peculiarities of some of their parts."

The Century Dictionary defines genus as "a classificatory group ranking next above the species, containing a group of species (sometimes a single species) possessing certain structural characters different from those of any others." It goes on, however, to say: "The value assigned to a genus is wholly arbitrary—that is, it is entirely a matter of opinion or current usage what characters shall be considered generic and thus constitute a genus; and genera are constantly modified and shifted by specialists, the tendency being mostly to restriction of genera, with the constant multiplication of their numbers, and the coinage of new generic names. A genus has no natural, much less necessary, definition, its meaning being at best a matter of expert opinion; and the same is true of the species, family, order, class, etc."

It will doubtless be readily granted, however much we may differ as to generic values, that at least all the individuals of the same species should belong to the same genus, but this, unfortunately, is not always the case, as some species vary sufficiently in structure to run into two or more genera, as these are frequently defined.

Having had the good or bad fortune to find about the middle of August, 1898, a mature larva closely resembling that of *E. Oregonensis*, though differing in colour, from which I bred on 1st of April, 1899, a moth so closely resembling *E. Egle*† that probably 99 men out of a 100

*Read before the Montreal Branch, 13th May, 1902.

†The question whether the generic name Euchætes, proposed by Harris, or Euchætias, proposed by me, should be used for the genus of which this moth is the type, I am willing to leave to the principal authorities on such matters to decide, but wish to say what I perhaps did not make sufficiently clear in my note on page 52 (correcting my error in regard to the name I proposed for a genus in the Coleoptera), that in giving Mr. Henshaw's views upon the subject, as conveyed to me by letter, I did not mean it to be inferred that I accepted or concurred in them.

would pronounce it to be that species, I naturally became very much interested.

I carried the moth with me to Washington, where it was carefully examined by Dr. Dyar, who pronounced that it belonged to the genus Pygarctia, as it had an accessory cell.

Before venturing to describe it, I determined to obtain as many of the species of the group as possible, and through the kindness of Mrs. Slosson was able to add a specimen of *Pygarctia Abdominalis* to my collection, and obtained by purchase several other species.

In Neumoegen and Dyar's "Preliminary Revision of the Bombyces of America north of Mexico," published in 1893–94*, all the moths for which the name Euchætes had been used were embraced in Hübner's genus Cycnia, which that author had also used for *Hyphantria Cunea*, but in September, 1897, Dr. Dyar published in the CANADIAN ENTOMOLOGIST "A Generic Revision of the Hipocritidæ (Arctiidæ)," in which the moths in question were divided into three genera, Cycnia characterized as having "veins 7 to 10 of primaries stalked," Pygarctia with "accessory cell present," and Euchætes "accessory cell absent," and in the list of genera and species these moths were distributed among these three genera as follows:

CYCNIA, Hübn.
tenera, Hübn.
sciurus, Boisd.
insulata, Walk.
PYGARCTIA, Grote.
abdominalis, Grote.
vivida, Grote.
murina, Stretch.
Bolteri, H. Edw.
elegans, Stretch.
scepsiformis, Graef.
albicosta, Walk.
EUCHÆTES, Harris.
egle, Dru.
eglenensis, Clemens.
Oregonensis, Stretch.
perlevis, Grote.
Spaguei, Grote.
zonalis, Grote.

When, however, I came to study the venation for myself, I got into difficulties at once, as I found that while *Tenera* had the veins 7–10 stalked as described, *Abdominalis* had no accessory cell, while *Egle* had it. I therefore immediately wrote to Dr. Dyar, who admitted that he had

* Journal N. Y. Ent. Soc., I.-II.

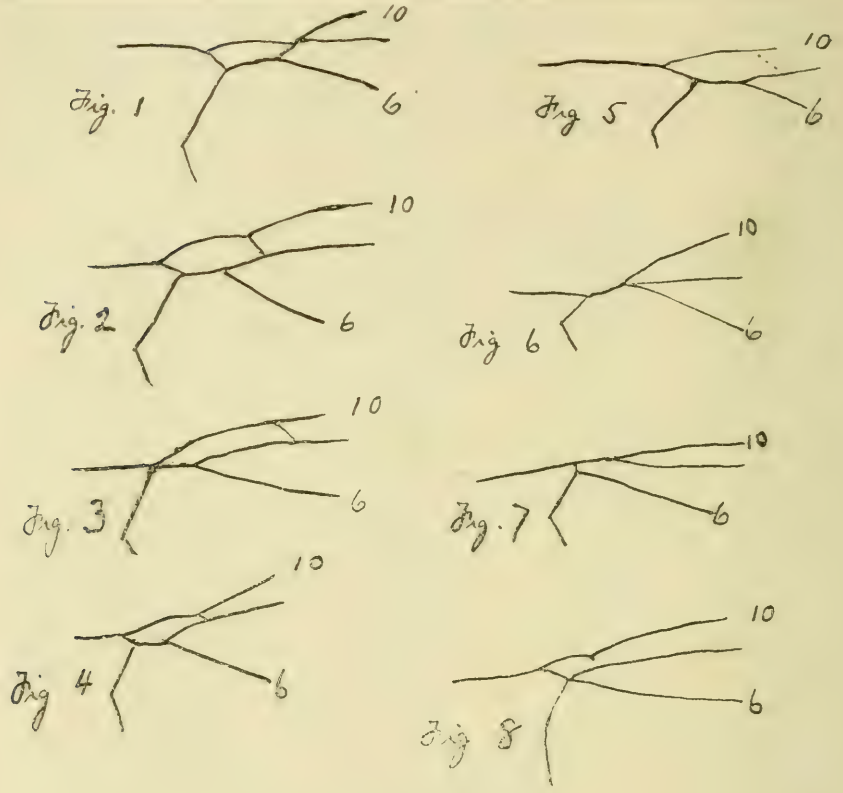
evidently made an accidental transposition when first looking up the characters, and kindly sent me the results of his examination of the species as represented in the National Museum, as follows:

CYCNIA	
tenera	no cell
sciurus	no cell
cadaverosa	no cell
PYGARCTIA.	
abdominalis	no cell
vivida	(not in collection)
murina	cell
elegans	cell
scepsiformis	cell
Bolteri	cell
EUCHÆTES.	
egle	cell
eglenensis	no cell
pudens	no cell
Oregonensis	no cell
perlevis	no cell
Spaguei	no cell
zonalis	(not in collection)

and suggested my transferring *Murina*, *Elegans*, *Scepsiformis and Bolteri* to Euchætes, and *Eglenensis*, *Pudens*, *Oregonensis*, *Perlevis* and *Spraguei* to Pygarctia. But when I came to examine my series of *Egle*, and found such an extraordinary range of variation both as to the presence or absence of the cell, and also as to the venation, I came to doubt whether any of these characters were sufficiently constant as to be of generic value.

I found an occasional specimen lacking the accessory cell, and several with it present on one side and absent on the other, as well as great variation in the branching of the veins.

When I had the pleasure of a visit from Dr. Dyar, April 23rd–24th, 1901, prior to his trip to Colorado, I showed him my series of *Egle*, and from an examination under a microscope he kindly drew for me the sketches from which the accompanying illustrations of venation have been prepared.



NOTES ON ILLUSTRATIONS.

No. 5.—The wing on the other side has the cell present.

No. 6.—The wing on the other side has a small cell present.

The specimens represented in the other figures are approximately the same on both sides.

From these figures it will be seen how many genera could be founded upon a few of my specimens of this common and well-known species.

When a common species is found to vary greatly in this way, it is fair to infer that an examination of an equal number of each of the other species in the same genus would probably disclose as surprising variations, and it therefore becomes of the highest importance that in founding new genera every available specimen should be carefully examined to see whether the characters proposed to be used for differentiation are sufficiently constant to warrant the erection of a new genus upon them, and authors should invariably state the number of specimens which they have examined for this purpose. If this were done we should have fewer genera, but they would be more satisfactory.

Sir George Hampson deals with these species in the third volume of his work on the moths of the world as represented in the British Museum, but uses a different arrangement from either of those used or suggested by Dr. Dyar, dividing them among the three genera, Ammalo, Walk.; Pygarctia, Grote, and Euchætes, Harris, which he characterizes according to the following table:

GENERA AS USED AND DEFINED BY SIR GEORGE F. HAMPSON, BART.

Ammalo, Walk.	Pygarctia, Grote.	Euchætes, Harris.
Poboscis fully developed.	Proboscis aborted, minute.	Proboscis aborted, minute.
Palpi upturned, not reaching vertex of head, the third joint short.	Palpi porrect, extending to just beyond frons.	Palpi porrect to just beyond the frons.
Antennæ of male bipectinate, with rather long branches, of female with short branches.	Antennæ of male bipectinate, with the branches short.	Antennæ bipectinate, with moderate branches in male, with very short branches in female.
Tibiæ with spurs moderate.	Tibiæ with spurs short, fore tibiæ with curved apical claw.	Tibiæ with spurs moderate.
Abdomen dorsally clothed with rough hair at base.	Abdomen smoothly scaled.	
Fore wing with veins 3, 4, 5 from angle of cell; 6 from upper angle; 7, 8, 9, 10 stalked; 11 free.	Fore wing with vein 3 from close to angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 from cell.	Fore wing with vein 3 from close to angle of cell; 4,5 from angle; 6 from upper angle 7, 8, 9 stalked; 10, 11 from cell.
Hind wing with vein 3 from close to angle of cell; 4, 5 from angle; 6, 7 from upper angle; 8 from beyond middle of cell.	Hind wing with veins 3, 4 from angle of cell; 5 from just above angle; 6, 7 from upper angle; 8 from towards end of cell.	Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle; 8 from beyond middle of cell.

Leaving out those species not found in America north of Mexico, the following is his arrangement :

AMMALO, Walk.

Insulata, Walk. (Halesidota), = *Pareuchætes Cadaverosa*, Grote.

Tenera, Hübn., = *Sciurus*, Boisd.

Eglenensis, Clem.

PYGARCTIA, Grote.

Spraguei, Grote.

Vivida, Grote.

Abdominalis, Grote.

Elegans, Stretch.

EUCHÆTES, Harris.

Antica, Walk. (Halesidota), = *Zonalis*, Grote.

Albicosta, Walk. (Phragmatobia), = *Scepsiformis*, Graef.

Perlevis, Grote.

Murina, Stretch.

Bolteri, Stretch.

Egle, Drury.

Oregonensis, Stretch.

Pudens, H. Edw.

It should be noted that the genus Ammalo is not regarded as being at all closely related to Pygarctia or Euchætes, but rather very much separated from them. It is treated of on pp. 82–86, while Pygarctia is described on pp. 415–417, and Euchætes on pp. 417–420.

Whether a fuller examination of a larger series of these moths would not again upset their arrangement and necessitate a new classification, the future alone can tell, but I feel very strongly that far too much classificatory work is done on very insufficient material, and after too superficial a study of the material available.*

*In Ent. News, XIII., 192, reference is made to *Psychophora Fasciata*, Skinner, one specimen of which received by Dr. Dyar was found to agree with the Noctuidæ in venation, while the next one received had the venation typical of the Geometridæ, thus showing the sometimes unsatisfactory nature of these characters.

A NEW COCCID FROM CALIFORNIA AT A VERY HIGH ALTITUDE.

BY EDW. M. EHRHORN, MOUNTAIN VIEW, CAL.

Exæretopus caricis, n. sp.

Adult ♀ salmon pink, shiny, about 2 mm. long and 1 mm. broad, elongate oval. Legs and antennæ light brown. ♀ secretes a mass of cotton all over her body, becoming so dense as to completely envelope the entire body, looking more like an elongated *Eriococcus*. This secretion extends caudad, forming a large egg-sac, which, including the whole insect, measures from 4 to 5 mm. Eggs salmon pink. Young larvæ orange colour. Adult ♀ after boiling in K. O. H. derm remains light brown. Margin beset with fine, short, straight spines, incisions having two stout curved spines. There are numerous short conical spines scattered over the derm with irregular rows of long fine hairs. Anal plates large and thick, each with four short, stout spines. Anal ring with six very long, stout hairs, which extend to caudal end of plates. Antennæ long, slender, tapering, 8-jointed. Joint 3 always longest and joint 7 always shortest, each joint with one or more fine hairs, joint 8 with several long hairs. *Formula:* 3.4. 5. 8. (1.2.) 6. 7.

	1.	2.	3.	4.	5.	6.	7.	8.
Measurements of joints in μ:	40.	40.	100.	55.	60.	32.	28.	48.
	40.	40.	80.	60.	50.	30.	24.	24.
	40.	40.	80.	60.	48.	32.	22.	36.
	40.	41.	100.	64.	52.	30.	25.	40.

Legs long and slender. Coxa about half as long as tibia and quite stout. Tibia very little longer than femur. Front tarsus two-jointed. Tarsal digitules long, fine, knobbed hairs about 56μ, those of claw stout, curved clubs, about 32μ. Legs not very hairy, trochanter with a long slender hair. Claw sharply curved.

Hab.—On stems of *Trisetum subspicatum*, (L.) Beauv., and *Carex Breweri*, Boott. Mt. Shasta, above timber line, September 3rd, 1901.

Note.—I have placed this interesting species in *Exæretopus* owing to its two-jointed tarsus. The only other species known is *E. formiceticola*, Newst. (The Ent. Mo. Mag., Vol. V., p. 204), and differs very much from the above species. *E. caricis* abandons the food-plant

at maturity and attaches itself to the under side of rocks, where the ♀ makes the ovisac and probably hibernates till spring, when the young larvæ crawl away in search of food. This is the first *Exæretopus* found in America, and is from the highest altitude at which any Coccid has been found, it being above timber line on Mt. Shasta, between 9,000 and 10,000 feet.

A NEW SAWFLY OF THE GENUS XYELA.

BY T. D. A. COCKERELL, EAST LAS VEGAS, N. M.

Mr. Ashmead has written thus of the Xyelidæ: "The imagoes appear very early in the year, or in February, March and April, deposit their eggs and then disappear, the consequence being that very few are taken, and only a few of the common forms are known." Of the genus *Xyela*, as now restricted, only one North American species, *X. minor*, Norton, has been described.

On May 1st of the present year, as we were going up to our classes in the Normal University at Las Vegas, N. M., my wife picked a small insect off my coat. It was at once transferred to the bottle which is never absent from the entomologist's person, and, upon inspection later, proved to be a new species of *Xyela*, herewith described:

Xyela luteopicta, n. sp.— ♂. Length of body about 2½ mm.; head and thorax variegated with black and bright yellow; abdomen black or nearly so above, yellow on venter; legs pale orange; antennæ with the first three joints reddish-brown, the other (filiform) joints black; wings very large, hyaline and iridescent, nervures black, stigma (very large) sepia. Antennæ 12-jointed, not hairy; head bright yellow, the occiput, a small spot just above level of antennæ, lines passing from the antennæ to the ocelli, the ocellar region, and a broad short longitudinal band on each side between the ocelli and the eyes, black. Thorax yellow ventrally; black dorsally, with a large yellow pentagonal area, on which are two black spots, a black V pointing anteriorly, and an anterior weaker V pointing posteriorly. On one side the wing is abnormal, one of the recurrent nervures being obliterated.

NEW CYCLORHAPHOUS DIPTERA FROM MEXICO AND NEW MEXICO.

BY D. W. COQUILLETT, WASHINGTON, D. C.

In the course of identifying a series of Diptera received by Dr. L. O. Howard, and collected in Mexico and New Mexico by Mr. C. H. T. Townsend, a number of new forms were encountered, and as manuscript names of these will soon be sent out it is desirable that these forms should be duly characterized; accordingly, the descriptions are presented for publication herewith.

Family SYRPHIDÆ.

Spilomyia obscura, new species.

Head black, the face, frontal triangle of male and lower part of front of female, prolonged upward along the eyes to a point nearly opposite the lowest ocellus, yellow; antennæ yellowish brown, the joints subequal in length, arista yellow, mouth-parts black; thorax black, a yellow spot on each humerus and a smaller one above it, a vitta extends from each postalar callosity obliquely to the suture, where it is prolonged inward as a silvery white streak; a pair of oblique yellow spots in front of scutellum, a yellow spot on posterior part of mesopleura, one on the sternopleura, one above front coxa and a small prominence beneath insertion of wing; scutellum wholly black; abdomen black, a yellow spot on each side of the first segment, an interrupted yellow fascia on anterior part of the second, broadly dilated at the sides, a yellow streak in each hind angle of this segment, third and fourth segments with a yellow fascia on the front part and another on the hind margin, the former interrupted on the third segment, sixth segment of female, except the front margin, yellow; coxæ black, a yellow spot on outer side of the hind ones; femora yellow, the posterior side, except at the ends, black, least extended on the middle ones; tibiæ yellow, their apices and the tarsi yellowish brown; wings hyaline, costal margin to the spurious vein brown; length, 15 to 17 mm. A specimen of each sex collected August 27th and September 11th.

Habitat.—Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdes, altitude about 7,300 feet).

Type.—Cat. No. 6290, U. S. National Museum.

Ocyptamus notatus, new species.

Head black, the face and broad sides of frontal triangle yellow, antennæ and proboscis black; body black, the prealar and postalar callosities, sides of scutellum, except at base, and a pair of circular or

oval spots on abdominal segments two to four, yellow, the spots on the second segment located between the centre and the lateral margin, those on the other two segments situated slightly in front of the middle; abdomen widest at base, subopaque, becoming somewhat polished posteriorly; front legs yellowish brown, ends of tibiæ and first two joints of the tarsi yellow, middle and hind legs black, base of middle tibiæ, first two joints of their tarsi and first three joints of the hind ones, yellow; wings hyaline, tinged with brown along the costa, the base and stigma dark brown, the costal cell dark gray; length, 12 mm. Four males collected February 24th and March 3rd to 9th.

Habitat.—Frontera, Tabasco, Mexico.

Type.—Cat. No. 6291, U. S. N. M.

Lycastrirhyncha Willistoni, new species.

Head black, with a slight bluish tinge, front thinly gray pruinose, crossed at middle by a velvet black fascia prolonged backward in the middle and at each end, a transverse row of four velvet black spots on vertex; face on upper part and the sides yellowish-gray pruinose, prolonged on sides of snout almost to its middle; antennæ reddish yellow; eyes sparsely long haired on the upper part; body black, slightly tinged with bronze, thinly gray pruinose; mesonotum marked with three velvet black vittæ, the median one complex, the lateral ones interrupted at the suture, behind which they are double; scutellum velvet black on basal half, second and third segments of abdomen with a pair of large yellow spots narrowly separated from the lateral margin, remainder of these segments, except their narrow yellow hind margins, velvet black, narrow hind margin of fourth segment also yellow, this segment with three velvet black spots in the form of a triangle, two along the hind border and the other in the middle in front; legs black, the front and middle knees yellow, hind knees and first two joints of middle tarsi sometimes also yellow; wings hyaline; length, 7 to 8 mm. Three males collected February 12th to 14th.

Habitat.—Frontera, Tabasco, Mexico.

Type.—Cat. No. 6292, U. S. N. M.

Sphiximorpha ancoralis, new species.

Head black, upper edge of occiput, lower part of front, except a median line dilated at base of antennæ and prolonged laterally on the face, and the face, except a median vitta, yellow; antennal process slender, dark brown; antennæ brown, the joints subequal in length, the

first two-thirds as long as the antennal process; proboscis dark brown; body black, the humeri, antealar callosity, a short vitta above base of wing, large spot on posterior side of mesopleura, smaller one on upper part of sternopleura, small one on lower part of pteropleura, sometimes very indistinct, the scutellum, sides of first abdominal segment and posterior borders of the following three, yellow, that on the fourth only slightly and very gradually dilated in the middle; fourth segment marked with an interrupted gray pruinose fascia which is produced forward at the point of interruption, second segment as long as the third; legs reddish yellow, bases of the tibiæ broadly pale yellow; middle and hind femora, except their ends, sometimes dark brown, one or more of the joints of the tarsi sometimes also dark brown; wings hyaline, the costal border to the third vein pale brown, lightest in costal cell and in front of last section of third vein; length, 10 mm. Six males and five females, collected March 26th and August 24th to September 4th.

Habitat.—Las Cruces, New Mexico.

Type.—Cat. No. 6293, U. S. N M.

Family Conopidæ.

Myopa fenestrata, new species.

Head yellow, the front and occiput, except the sides and lower portion, orange yellow, sides of face each marked with two to four brown spots, the upper one contiguous to the eye, all rarely wanting, a brown stripe at each lower corner of front and five brown spots, two of which are near each eye on upper half of front, the fifth near centre of front, two or more of these spots sometimes coalesced; two brown spots near middle of each side of occiput, hairs of front and upper part of occiput black, on remainder of occiput, face and cheeks yellowish white, those on lower part of cheeks rather long and abundant; antennæ reddish yellow; palpi and first segment of proboscis black, remainder of proboscis reddish brown; body black, the inner part of the humeri, a streak behind each, a spot on each postalar callosity, several spots on pleura and the genitalia, reddish brown, a yellow stripe on either side of the metanotum; mesonotum thinly whitish pruinose, a distinct white spot near each corner and indications of a pair of whitish vittæ on the anterior portion, abdomen, except front angles of the segments, gray pruinose and with dark reflecting spots; legs black, coxæ marked with reddish, apices of femora, broad bases of middle and hind femora, bases and a median band on tibiæ, and whole of tarsi, yellow; base of wings to root of second

vein, extending along fifth vein to base of discal cell, bright yellow, remainder of wing from costa to fifth vein dark brown, a streak in outer half of discal cell, a fascia across middle of first posterior cell, sometimes interrupted, and nearly whole of second posterior cell, hyaline; wings behind fifth vein smoky gray; apex of first vein and the costa from apex of auxiliary to midway between apices of second and third veins, bright yellow; halteres yellow; length, 7 to 9 mm. Fifty-six specimens, of both sexes, collected August 11th to 27th.

Habitat.—Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdes, about 7,300 feet altitude).

Type.—Cat. No. 6294, U. S. N. M.

Myopa pulchra, new species.

Differs from *fenestrata* as follows: Sides of face with only the uppermost brown spot, sides and hind margin of mesonotum, entire scutellum, broad sides of first two abdominal segments, front corners of the third and middle of the last segment, yellow; mesonotum marked with four velvet black vittæ; yellow on bases of wings more extended, including the fourth vein to base of discal cell, hyaline fascia of first posterior cell reduced to a subtriangular spot next to the fourth vein, wings behind fifth vein nearly pure hyaline; length, 8 mm. Five specimens, of both sexes, collected August 26th to September 2nd.

Habitat.—Same as the preceding species.

Type.—Cat. No. 6295, U. S. N. M.

Sicus brevirostris, new species.

Face and cheeks pale yellow, front reddish yellow, the upper corners and occiput black, antennæ reddish yellow, inserted nearly length of last two joints from the adjacent eye, first and third joints slightly longer than broad, the second as wide as long, slightly shorter than the third, mouth-parts black, last section of proboscis less than one-third as long as the preceding section; body black, grayish pruinose, apex in male and whole of genitalia of female polished, second and third abdominal segments in the male in ground colour largely yellow; legs black, the knees yellow; wings hyaline, tinged with gray at the base and in the costal cell, first posterior cell closed and petiolate; halteres yellow; length, 4 mm. Four males and three females collected August 29th to September 7th.

Habitat.—Same as the preceding species.

Type.—Cat. No. 6296, U. S. N. M.

This European genus has not previously been recorded from this continent.

Zodion perlongum, new species.

Front and middle of upper part of occiput reddish yellow, remainder of occiput black, changing to yellow below, gray pruinose, face and cheeks light yellow, antennæ reddish yellow, first joint wider than long, the others slightly longer than wide, the second a trifle longer than the third, arista black, the apical half whitish, proboscis black; thorax and scutellum black, gray pruinose, mesonotum marked with two velvet black vittæ and with three dark vittæ between them and an interrupted one outside of each of the two black ones; abdomen narrower than, but fully twice as long as, the thorax, black, the second segment largely yellow, dorsum of abdomen yellowish-gray pruinose, the under side and last segment of genitalia polished; abdomen widest at base of second segment, tapering posteriorly to about half this width, segments two to four noticeably longer than wide, the third one and one-half times as long as wide; legs reddish yellow, upper sides of femora largely black, last tarsal joint dark brown; wings hyaline, tinged with gray at the base, halteres yellow; length, 8 mm. Four females.

Habitat.—White Mts., New Mexico (Rio Ruidoso, about 6,700 feet altitude, July 27th); Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdas, about 7,300 feet altitude, August 26th); and Colorado (H. K. Morrison).

Type.—Cat. No. 6297, U. S. N. M.

Family Tachinidæ

Comatacta, new genus.

Near *Siphosturmia*, but the antennæ reaching only slightly more than two-thirds of distance to the oral margin and the thorax densely covered with rather long yellowish and white hairs; head at vibrissæ longer than at base of antennæ, vibrissæ on a level with anterior edge of oral margin, one or two bristles above each, sides of face bare, each nearly half as wide as the facial depression, frontal bristles descending nearly to apex of second antennal joint, no ocellar bristles, two pairs of orbital bristles in the female, wanting in the male, third joint of antennæ slightly over twice as long as the second, arista pubescent toward base, the longest slightly longer than greatest diameter of arista, penultimate joint of arista broader than long, cheeks about one-sixth as wide as the eye-height, eyes bare, proboscis slender, the portion beyond the basal

articulation shorter than height of head, labella small, palpi short, clavate; hind tibiæ evenly ciliate with rather short bristles on the anterior-outer side; first posterior cell open, ending noticeably before the wing-tip, bend of fourth vein without an appendage, hind crossvein nearer to the bend than to the small crossvein, base of third vein bearing a single bristle, other veins bare.

Type.—*Brachycoma pallidula*, v. d. Wulp (Biol. Cent.-Am., II., p. 95), from Yucatan, Mexico. Five males and eight females are before me from San Rafael, Vera Cruz, Mexico.

Microphthalma pruinosa, new species.

Head yellow, occiput and sides of front black, the latter yellowish pruinose, frontal vitta brownish black; vertex one-third as wide as either eye, sides of face sparsely covered with black bristly hairs, antennæ nearly half as long as the face, yellow, the third joint, except at base, black, nearly twice as long as the second, vibrissæ near one-third of distance from anterior oral margin to base of antennæ, cheeks posteriorly about as wide as the eye-height, palpi yellow, proboscis dark brown; body wholly grayish pruinose, black, the broad sides of abdomen and the genitalia yellow, mesonotum marked with four black vittæ, three post-sutural dorsocentral bristles, three sternopleurals, second and third abdominal segments bearing marginal bristles, the fourth covered on the apical half; legs black, tibiæ largely yellow, pulvilli greatly elongate; wings hyaline, tinged with yellowish brown at base and along the veins, costal spine very long, a long stump at bend of fourth vein, calypteres whitish; length, 9 to 12 mm. Four males.

Habitat.—White Mts., New Mexico (South Fork Eagle Creek, altitude about 8,000 feet, August 13th); and Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdes, altitude about 7,300 feet, July 19th).

Type.—Cat. No. 6298, U. S. N. M.

Araba nebulosa, new species.

Black, including the palpi; front golden-yellow pruinose, greatly narrowed anteriorly, vertex three-fourths as wide as either eye, uppermost frontal bristle in each row over twice as far from the one in the opposite row as from the adjacent eye, a reclinate bristle between it and the eye, two pairs of orbital bristles, sides of face bearing a row of short black hairs near the eye, ridges bristly on the lower three-fifths, frontals descending to middle of second antennal joint, antennæ slightly shorter than the face, the third joint four times as long as the second, arista

thickened nearly to the middle; thorax gray pruinose, marked with five black vittæ, the three median ones reaching slightly beyond the suture and appearing confluent when viewed from behind, three pairs of post-sutural dorsocentral bristles, two sternopleurals, scutellum gray pruinose, the sides broadly velvet black, abdomen gray pruinose, the first three segments with a transverse row of five velvet black spots, broad apex of the fourth segment polished, second and third segments with a marginal pair, the fourth with a marginal row of bristles; first joint of front tarsi shorter than the second and greatly thickened, the lower outer angle bearing a cluster of rather long yellow bristly hairs, pulvilli one-third as long as the last tarsal joint, hind tibiæ outwardly somewhat ciliate with bristles of an unequal length; wings hyaline, a small brown spot at apex of first vein, a larger one at small crossvein, prolonged toward apex of discal cell, a narrow one in outer lower corner of this cell, a large spot at apex of second vein and on bend of fourth vein, the latter furnished with a rather long appendage, the vein beyond it nearly straight, terminating a short distance before the extreme tip of wing; length, 5 mm. Four specimens collected May 31st.

Habitat.—Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdes, altitude about 7,300 feet).

Type.—Cat. No. 6299, U. S. N. M.

Family Dexidæ.

Trixodes, new genus.

Head in profile nearly hemispherical, front rather prominent, face strongly retreating below, facial depression nearly elliptical in outline, a rather low, broad median carina, vibrissæ absent, vibrissal angles widely separated, situated the length of the antennæ above the anterior oral margin, ridges bare, antennæ less than one-fourth length of face, the second and third joints of nearly an equal length, arista bearing a few hairs, the longest of which are nearly twice as long as greatest diameter of arista, penultimate joint of the latter as broad as long, frontal bristles descending nearly to middle of second antennal joint, ocellar and post-ocellar bristles small or wanting, only one pair of verticals, sides of face on upper half bare, the remainder and the cheeks sparsely covered with short bristly hairs, cheeks four-fifths as wide as the eye-height, eyes bare, proboscis one-fourth as long as height of head, rather robust, labella small, palpi short clavate; bristles of tibiæ very short, hind tibiæ not ciliate with bristles; third vein bristly on the basal fourth of first section,

other veins bare, first posterior cell open, ending far before the wing-tip, hind crossvein much nearer bend of fourth vein than to small crossvein, this bend angular and without an appendage, costa bare, no costal spine. Type, the following species:

Trixodes obesa, new species.

Dark brown, apex of palpi yellow; vertex of male as wide as either eye, in the female one and one-fourth times as wide, no orbital bristles; head, except the frontal vitta, thinly grayish pruinose, mesonotum thinly gray pruinose, marked with four black vittæ, bristles very short, five pairs of postsutural dorsocentral bristles, abdomen very thinly grayish pruinose, the bristles very short, marginal ones on the third and sometimes on the second segment; front pulvilli of male rather elongate, but much shorter than the last tarsal joint; wings hyaline, the base as far as base of discal cell pale brown, crossveins faintly clouded with brown; calypteres brown; length, 16 to 19 mm. Two males and two females.

Habitat.—Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdes, September 9th); and West Fork Gila River, New Mexico (July 13th).

Type.—Cat. No. 6300, U. S. N. M.

Mochlosoma rufipes, new species.

Black, the antennæ, face, cheeks, palpi, humeri, scutellum, femora and tibiæ reddish yellow, frontal vitta deep brown, with a tinge of yellow; vertex as broad as either eye, two pairs of orbital bristles, sides of front and face, except the lower part, densely gray pruinose, upper-inner fourth of face sparsely covered with short bristly hairs, antennæ two-fifths as long as the face, the second joint as long as the third, arista long plumose, cheeks three fourths as broad as the eye-height, proboscis setaceous, the portion beyond the articulation twice as long as height of head; mesonotum gray pruinose and with five blackish vittæ, scutellum thinly, abdomen densely, gray pruinose, the latter with dark olivaceous reflecting spots, second and third segments with discal and marginal bristles, the fourth sparsely covered, except on the extreme base; wings hyaline, the base whitish, bend of fourth vein arcuate, calypteres white; length, 13 mm. Eight females.

Habitat.—Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdes, about 7,300 feet altitude, September 5th to 18th).

Type.—Cat. No. 6301, U. S. N. M.

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, A. M., ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 7.—Continued from p. 166.)

Family XXIX.—Eumenidæ.

To this family belong the potter wasps. They differ from the paper-making wasps in being solitary and in constructing their nests of mud or clay, instead of macerated woody fibre or pulp. It is perhaps one of the largest, if not the largest, families in the Vespoidea, and is well represented in all parts of the world by many genera and species.

The species superficially resemble the Vespidæ, but are quite distinct and are easily distinguished by the cleft or toothed claws, the claws never being simple or edentate as in the social wasps.

The family, like the Vespidæ, has reached its greatest development in warm or tropical countries.

Our knowledge of this family, as well as of the *Vespidæ* and *Masaridæ*, is due mainly to the labors of the distinguished Swiss entomologist, Henry de Saussure, who has for more than half a century devoted most of his time to elucidating the groups, genera and species. He has done more work on these families than any other man, living or dead, and all of his papers should be in the hands of those who contemplate studying these wasps.

His greatest work, "Etudes sur les Vespides," in 3 Vols., 8 vo., with plates, was published during the years 1852 to 1856, and treats of the *Eumenidæ*, *Vespidæ* and *Masaridæ*.

These "Etudes" are typical of the best kind of systematic work, and should afford a model for us all to strive to imitate.

All wasps belonging to the family *Eumenidæ* are predaceous principally upon Lepidopterous larvæ, but a few attack also the larvæ of sawflies belonging to the superfamily Tenthredinoidea. Although most of these wasps prey upon Lepidopterous larvæ as do the social wasps, yet in their habits they are quite different. The social wasps chew up or macerate their food before feeding to their young, which they carefully

watch and constantly feed during all stages of larval development. The potter wasps, on the contrary, act quite differently.

A potter wasp will go off, catch a caterpillar, sting it into insensibility, and then carry it off to its mud cell. This operation is repeated again and again, or until eight or a dozen or more caterpillars have been captured and stored away in its cell. An egg is then deposited on this fresh food, the cell is hermetically closed, and the mother wasp has finished her labours once and for all, and she cares no more for her still unborn offspring.

The young larva of a potter wasp receives no attention from its mother; on hatching, it finds sufficient fresh food at hand in the semi-paralyzed caterpillars stored up in the cell, and is able to care for itself.

I have recognized in the *Eumenidæ* four distinct subfamilies:

Table of Subfamilies.

1. Middle tibiæ with *two* apical spurs.....2.
   Middle tibiæ with *one* apical spur.....3.
2. Second cubital cell receiving both recurrent nervures.
   Second cubital cell oblong or quadrate, not or only slightly narrowed above; claws with a tooth near the middle.....Subfamily I.—Ischnogasterinæ.
   Second cubital never oblong or quadrate, always *much* narrowed above; claws cleft.....Subfamily II.—Discoelinæ.
   Second and third cubital cells each receiving a recurrent nervure.....Subfamily III.—Raphiglossinæ.
3. Second cubital cell receiving both recurrent nervures.....Subfamily IV.—Eumeninæ.

Subfamily I.—Ischnogasterinæ.

The two spurred middle tibiæ separate this subfamily from the *Eumenidæ*; the second cubital cell receiving *both* recurrent nervures, separates it from the *Raphiglossinæ*, which have the second and third cubital cells each receiving a recurrent nervure; while from the *Discoelinæ*, to which it is closely allied, it is separated by the shape of the second cubital cell, which is oblong or quadrate, and by the claws, which have a tooth at or near the middle, beneath.

Table of Genera.

Clypeus elongate, rounded or triangular anteriorly, but *not* dentate; mandibles long ..... Ischnogaster, Guérin.
(Type I. fulgidipennis, Guér.)

Clypeus subemarginate or bidentate anteriorly; mandibles oblong, narrowed, dentate ..... Ischnogasteroides, Magretti.
(Type I. flavus, Magr.)

Subfamily II.—Discoelinæ.

This group was first separated by Thomson, who called it a tribe. It is readily recognized by the cleft claws and by the shape of the second cubital cell.

Table of Genera.

1. Labial palpi three-jointed ..... 2.
Labial palpi four-jointed ..... 6.
2. Petiole of abdomen swollen at the middle, and more or less contracted at both ends; antennæ inserted just above the clypeus ..... 3.
Petiole of abdomen elongate, contracted or slender only at the base; antennæ inserted on the middle of the face ..... 5.
3. Second abdominal segment not contracted into a distinct petiole at base ..... 4.
Second abdominal segment contracted into a distinct petiole at base; expansion of the petiole globularly lengthened.. Didymogastra, Perty.
(Type D. fusca, Perty.)
4. Second abdominal segment subsessile or very briefly petiolate ..... Zethusculus, Saussure.
(Type Zethus Jurinei, Sauss.)
Second abdominal segment sessile or subsessile, enlarged gradually; clypeus transverse, lozenge-shaped, forming a sharp lateral angle on each side ..... Heros, Saussure.
(Type Zethus gigas, Spinola.)
5. Mandibles short, obliquely truncate ..... Calligaster, Saussure.
(Type C. cyanopterus, Sauss.)
6. Petiole neither short, polished, nor campanulate ..... 7.
Petiole short, polished, campanulate ..... 9.
7. Mandibles short, stout ..... 8.
Mandibles rather long, obliquely truncate and 4-dentate ..... Discoelius, Latreille.
(Type Vespa zonalis, Panz.)

8. Petiole elongate, linear; mandibles obliquely truncate; clypeus wider than long.....Elimus, Saussure.
(Type E. australis, Sauss.)

Petiole elongate, but not linear, either clavate or subclavate, narrowed towards base; second cubital cell angulate above...Labus, Saussure.
(Type L. Humbertianus, Sauss.)

9. Clypeus transverse ovate, much wider than long, the anterior margin medially bidentate.....Stroudia, Gribodo.
(Type S. armata, Gribodo.)

Subfamily III.—Raphiglossinæ.

In this subfamily the middle tibiæ have two apical spurs as in the two previously-defined subfamilies, but from these it is at once separated by the venation of the front wings, the second and the third cubital cells each receiving a recurrent nervure. In the other subfamilies the second cubital cell receives both recurrent nervures.

Table of Genera.

1. Mandibles short, 4-dentate; labial palpi 3-jointed, the joints long.....2.

Mandibles long, somewhat pointed and not distinctly dentate; labial palpi 4-jointed.....3.

2. Abdomen subsessile, the first segment not long; labium not especially long; maxillary palpi 6-jointed.....Stenoglossa, Saussure.
(Type Raphiglossa odyneroides, Saussure.)

Abdomen petiolate, the first segment long; labium very long; maxillary palpi 5-jointed.....Raphiglossa, Saunders.
(Type R. eumenoides, Saund.)

3. Abdomen petiolate; labium short; maxillary palpi 6-jointed, the joints short.....Gayella, Spinola.
(Type G. eumenoides, Spinola.)

Subfamily IV.—Eumeninæ.

To this subfamily belong all Eumenids having the middle tibiæ with a single apical spur. The second cubital cell receives both recurrent nervures.

It is the largest and most extensive group in the family, and many genera and species are known.

I have divided it into three minor groups or tribes, which may be recognized by the characters employed in the following table:

Table of Tribes.

Second cubital cell not petiolate, although often narrowed or angulate above; mandibles most frequently long, acute, and when united forming a long beak, the teeth lateral.

Abdomen distinctly petiolate.....Tribe I.—Eumenini.

Abdomen sessile or subsessile, never distinctly petiolate.....Tribe II.—Odynerini.

Second cubital cell distinctly petiolate.....Tribe III.—Alastorini.

Tribe I.—Eumenini.

This tribe is separated from the *Alastorini* by the non-petiolate second cubital cell, and from the *Odynerini* by the distinctly petiolate abdomen, the species being, as a rule, narrower, more elongate, and less robust.

Table of Genera.

1. Maxillary palpi 3-jointed; antennæ inserted on the middle of the face.....2.

   Maxillary palpi 6 jointed.....3.

2. Mandibles rather long and narrow, with blunt teeth on the inner margin; anterior angles of pronotum not acute.....Montezumia, Saussure.
   (Type M. rufidentata, Sauss.)

3. Labial palpi 4-jointed; second abdominal segment not constricted into a petiole at base, or, at the most, subpetiolate; clypeus longer than wide.....4.

   Labial palpi 3-jointed; second abdominal segment constricted into a petiole at base; head large, quadrate, the clypeus wider than long.....Zethus Fabricius.
   (Type Vespa coeruleopennis, Fabr.)

4. Mandibles at apex 3- or 4-dentate.....5.

   Mandibles at apex *bidentate*.....6.

5. Mandibles long, 4-dentate, the teeth, however, usually indistinct; clypeus at apex usually truncate; petiole long; third cubital cell irregular.....Eumenes, Fabricius.
   (Type Vespa coarctata, Linné.)

   Mandibles 3-dentate, the teeth acute; clypeus at apex bidentate; petiole long, subclavate, a little longer than the thorax; third

cubital cell quadrate or nearly; front angles of pronotum acute. (Liberia, Africa)..... Micreumenes, Ashmead, g. nov.
(Type M. Curriei, Ashm. MS.)

6. Petiole of abdomen rather short; wings very large..... Pachymenes, Saussure.
(Type P. sericea, Sauss.)

Tribe II.—Odynerini.

Into this tribe fall the vast majority of the known genera and species belonging to the subfamily *Eumeninæ*. They are easily recognized by the sessile, or, at most, subsessile abdomen, and by their shorter, stouter, more robust form.

Table of Genera.

1. Abdomen with the first segment quite differently formed, neither distinctly funnel-shaped nor subcampanulate, often truncate at base..... 2.

Abdomen with the first segment funnel-shaped or subcampanulate, subbidentate medially; maxillary palpi 6-, labial palpi 4-jointed..... Nortonia, Saussure.
(Type Odynerus intermedius, Sauss.)

2. First abdominal segment above, near the base, *without* a transverse carina..... 3.

First abdominal segment above, near the base, *bounded* by a transverse carina..... 11.

3. Maxillary palpi 5-jointed or less..... 12.
Maxillary palpi 6-jointed..... 4.

4. Labial palpi 3-jointed..... 5.
Labial palpi 4-jointed..... 7.

5. Labial palpi neither very long nor plumose..... 6.
Labial palpi very long, plumose; mandibles distinctly 4- or 5-dentate..... Pterocheilus, Klug.
(Type P. Pallasii, Klug.)

6. First joint of maxillary palpi very large, much swollen, almost as long as the following joints united; last joint of the labial palpi very small; ♂ antennæ simple..... Abisba, Mitchell.
(= Monerebia, Sauss.)
(Type Vespa ephippium, Fabr.)

First joint of maxillary palpi not much swollen and much shorter than the following joints united; last joint of the labial palpi not especially small; ♂ antennæ enrolled at apex..Micragris, Saussure.
(Type M. spinotæ, Sauss.)

7. Clypeus *not* transverse, as long or longer than wide.....8.
Clypeus transverse, wider than long; labial palpi and paraglossæ very slender.....Leptochilus, Saussure.
(Type Pterochilus mauritianus, Lepel.)

8. Last three joints of maxillary palpi normal, not very small; labial palpi and paraglossæ not especially slender.....9.
Last three joints of maxillary palpi very small..Rhynchium, Spinola.
(Type Vespa oculata, Fabr.)

9. Mesonotum *without* distinct parapsidal furrows, either wanting or only vaguely defined basally; ♂ antennæ at apex ending in a hook or spirally contorted.....10.
Mesonotum *with* usually distinct parapsidal furrows; ♂ antennæ at apex simple.....Odynerus, Latreille.
(Type Vespa murarius, Latr.)

10. Thorax coriaceous or closely finely punctate; clypeus at apex usually semicircularly emarginate, bidentate; antennæ widely separated at base, in ♂ at apex depressed and spirally contorted; mandibles 2- to 3-dentate.....Hoplomerus, Westwood.
(Type Vespa spinipes, L.)
Thorax punctate, not coriaceous; clypeus at apex truncate or subemarginate; antennæ not widely separated at base, in ♂ ending in a hook; first abdominal segment dorsally at apex with a short median groove; second ventral segment produced and truncate at base; mandibles 4-dentate.....Leionotus, Saussure.
(Type Odynerus humeralis, Hal.)

11. First abdominal segment truncate at base, not divided by a longitudinal groove or furrow; antennæ in ♂ ending in a hook.
Maxillary palpi 6-jointed.....Ancistrocerus, Westwood.
(Type Vespa parietum, Linné.)
Maxillary palpi 5-jointed.....Monobiella, Ashmead, gen. nov.
(Type Vespa atrata, Fabr.)
First abdominal segment somewhat funnel-shaped, and divided above by a deep longitudinal groove; antennæ in ♂ simple.....Symmorphus, Wesmael.
(Type Vespa sinuata, Fabr.)

12. Maxillary palpi 3- or 4-jointed.....13.
Maxillary palpi 5-jointed.
Labial palpi 3-jointed.....Monobia, Saussure.
(Type Vespa quadridens, L.)
Labial palpi 4-jointed.....Hypagris, Saussure.
(Type H. abdominalis, Sauss.)

13. Maxillary palpi 4-jointed.....14.
Maxillary palpi 3-jointed.....15.

14. Metathorax quadridentate.....Antagris, Saussure.
(Type A. aequatorialis, Sauss.)
Metathorax concave, bidentate or bispinose.....Paragris, Saussure.
(Type P. Humbertii, Sauss.)

15. Metathorax short, impressed or subconcave posteriorly, the postscutellum often broadly but not deeply emarginate or impressed at apex; mesonotum without distinct furrows, at the most represented by two delicately impressed abbreviated lines posteriorly; mandibles long, acute.....Synagris, Latreille.
(Type Vespa cornuta, L.)

Tribe III.—Alastorini.

This tribe is separated from the two previously-defined tribes by the venation of the front wings, the second cubital cell being distinctly petiolate.

Table of Genera.

1. Abdomen sessile or subsessile.....2.
Abdomen distinctly petiolate.....3.

2. Mandibles long, acute, bluntly dentate within; maxillary palpi 6-jointed; labial palpi long, 4-jointed, the last joint minute.
First abdominal segment *without* a transverse suture or furrow.....Alastor, Lepeletier.
(Type A. atropos, Lepel.)
First abdominal segment *with* a transverse suture or furrow.....Alastoroides, Saussure.
(Type Alastor clotho, Lepel.)

3. Form slender; thorax elongate.....Smithia, Saussure.
(Type S. Natalensis, Sauss.)

THE MAPLE COTTONY PHENACOCCUS.

BY GEO. B. KING, LAWRENCE, MASS.

Phenacoccus acericola, n. sp.

Since 1880, when the above-named species was found and described as the European *Pseudococcus aceris*, Geoff. *(Phenacoccus)*, by Miss Emily A. Smith, it has until recently been supposed to have been that species.

The latter part of 1890, Prof. Cockerell wrote me that he believed our species was distinct from that of Europe, and suggested that I should describe it as new if upon further investigation no reason appeared to the contrary. At the meeting of the Association of Economic Entomologists of 1891, at Denver, Colorado, he speaks of it as being without a name.

As I knew of no place in the vicinity where I live, I asked Dr. George Dimmock, of Springfield, Mass., if he would kindly collect and send me some specimens for study, which he did last season. The following description is from the material sent, together with some descriptive notes taken from Dr. Howard's excellent account given in "Insect Life." The first account of the *Maple Cottony Phenacoccus* appeared in the "North American Entomologist," April, 1880, by Miss Emily A. Smith. The second was by Prof. Comstock in his work published in the annual report of the U. S. Department of Agriculture for 1881, and the third by Dr. Howard in "Insect Life," 1894. It seems quite evident that Dr. Howard had some doubt about the identity of the species, and calls attention to some of the characters which seemed to differ from Signoret's account of the European *Phenacoccus aceris*, Geoff.

Our American species when seen on the leaves appear as an irregular oval cottony mass which adheres to anything touching it and resembles very much the cottony ovisac of a *Pulvinaria*. The cottony material is about 6 mm. in diameter and covers the insect and her eggs.

Length of ♀ about 5 mm. long, 3 broad, plump, light yellow. Boiled in caustic potash, they turn orange red. The internal juice pressed out, the skin is colourless. The upper surface of the body is more or less covered with spinnerets and these are more dense at the posterior extremity. The margin of the body has several groups of short spines. Antennæ 9 jointed, measuring in μ:

Joints	1.	2.	3.	4.	5.	6.	7.	8.	9.
	44.	44.	44.	30.	40.	32.	32.	28.	64.
	44.	44.	44.	32.	44.	32.	28.	28.	64.

Joint 9 is longest, 3 and 5 equal, 6 and 8 usually equal, 1 and 2 and 3 are equal and longer than any of the next five joints. The last sending in the fall, when the leaves were found on the ground, had well advanced females with their abdomen well filled with eggs, and when cleared with potash they showed only an 8 jointed antenna as follows:

Joints (1) 40. (2) 60. (3) 48. (4) 72. (5) 40. (6) 40. (7) 28. (8) 60. Middle leg, coxa 120, femur and trochanter 240, tibia 200, tarsus 80. The legs are somewhat slender, and the claws are thin, sharp, thickened at the back, but not toothed as described by Prof. Comstock.

Distribution.—So far as known to me, the following are the only localities where the species have been found:

Peoria, Ill., Miss Emily A. Smith; Lancaster, Pa., Dr. Rathvon; Mount Carmel, Illinois, Prof. W. G. Johnson; Kingston, R. I., Prof. L. F. Kinney; New Jersey, Dr. John B. Smith; Cumberland, Maryland, Prof. W. G. Johnson; Albany, Athens, Brooklyn and Middleton, N. Y., Prof. E. P. Felt; Jamaica Plain and Brookline, Mass., Mr. John G. Jack; Springfield and Holyoke, Mass., R. A. Cooley.

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New York State Entom. Rpt., 151–616.

THE EGG OF THE WATER SCORPION (*RANATRA FUSCA*).

BY R. H. PETTIT, AGRICULTURAL COLLEGE, MICH.

In his "Insect Book," Dr. L. O. Howard states that the egg of *Ranatra* has not as yet been described from the United States. It is hoped that the following note may be of interest to someone:

On June 24, 1900, the writer was so fortunate as to find a large number of these eggs at Pine Lake, near Lansing, Mich. As the eggs were not recognized at first, they were allowed to hatch, and the nymphs allowed to become about half-grown.

The eggs are white in colour, long oval in form (about 3½ mm. long), with two long spindle-like appendages (about 4 mm. long) at one end. The surface is nearly smooth, not glossy, and covered with many slightly raised rounded elevations, visible when greatly magnified. The eggs are placed quite abundantly in the rotting stems of reeds and cat-tails, several inches under the surface of the water, the egg itself usually being almost out of sight, only the appendages being noticeable. Where they are numerous, the effect is that of a small cheval-de-frise.

No connection seems to exist between the interior part of the egg and the processes. The latter seem to be appendages of the outer shell alone, and their purpose that of protection against predatory vertebrates.

The young nymph is provided with a short anal process at birth. This process is deeply grooved on the ventral surface.

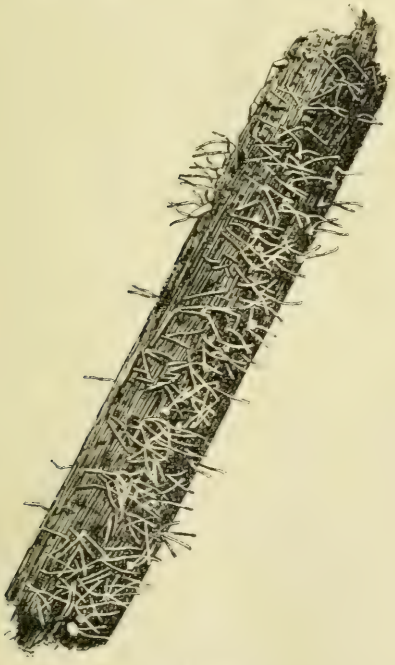

FIG. 11.

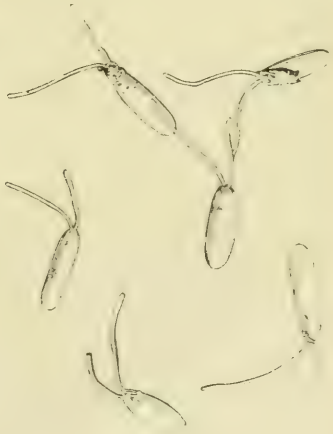

FIG. 12.

Fig. 11 shows a piece of aquatic plant with the eggs slightly enlarged in situ. Fig. 12 shows several of the eggs magnified about 4¼ times.

LIFE-HISTORY OF LYDA FASCIATA (NORTON), FAM. TENTHREDINIDÆ.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

Full-grown larvæ were taken on wild cherry (Prunus) in the latter part of September, 1901. Placed in a box over earth, they fed but a day or two, turned a deep green, and, entering the earth two to three inches, formed rounded cells, in which they remained as larvæ all winter, transforming to pupæ just before emergence. They are gregarious, remaining in their web, filled with its mass of exuvia, until full-grown, when, as their growth is completed, individually they drop from it and enter the ground. One which was kept under observation formed a pupa on April 28th, and emerged eight days thereafter. The pupal skin is very thin, showing distinctly the parts of the enclosed imago. This brood commenced emerging April 25th, and a few individuals are still coming out, May 31st. In the earlier days the males predominated, later the females. Altogether, 134 males and 123 females have appeared. Copulation took place at once, the pair remaining in coitu from three to five hours. One female (the first observed) was furnished with a spray of wild cherry, and on the night of the 13th of May deposited 76 eggs on the under side of a leaf, extending from the tip half its length. They were laid side by side, in rows of five to seven, from midrib to margin, and in little slits cut in the epidermis of the leaf, being attached by a gummy secretion.

Egg.—Size 1.5 x .5 mm. Sordid white, glossy, and apparently smooth, opaque.

Hatched May 22nd, turning to a bright yellow the day before. The young larvæ do not eat the egg shells.

First Stage.—Head round, shining, black at vertex, face and mouth-parts paler, eyes black. Body dull orange, deeper along an enlarged substigmatal wrinkled fold, which extends the entire length, giving the body a flattened appearance. Thoracic feet and anal plates black. Above the eyes are movable 3-jointed antennal-like processes, already mentioned by Packard (5th Report U. S. Entom. Commission), his figure, without doubt, referring to this species. Attached to the sides of the upper anal plate are two similar processes, but apparently 5-jointed. The young larvæ immediately congregate and begin to spin a web, attaching another leaf, if possible, to form their domicile, and attack the edges of the leaf, consuming all parts of it. Length, .12.

May 23. Second stage.—Head darker, a depression on the face between the eyes. Otherwise unchanged. Length .16.

May 25. Third stage much as before. Length .21.

May 27. Fourth stage.—In this stage the black colour of the head, ventral plates, thoracic feet and antennal appendages is intensified. The substigmatal fold becomes thicker and more solid in colour. The spiracles and a series of broken yellowish lines on each segment subdorsally make a faint lateral stripe, dorsally and sublaterally translucent dull greenish. Length .33.

May 29. Fifth stage.—Much the same as before. One larva discovered moulting. The head apparently splits apart vertically at the mouth without previous visible distension. After moult the skin is partially eaten, but the head-covers remain in the web. The body of the larva retains its normal colours, but the head and ventral plates with their appendages are glassy and colourless, except the eyes, which are black, and a faint tinge of black about the mouth, and remains so for several hours after moult. Length .56.

May 31. Sixth stage.—A decided thickening of substigmatal fold, which now becomes a reddish orange. The broken markings above it and the subdorsal lines are also heavier and more solid in colour. Translucent intervals darker and presenting a slightly shagreened appearance. Instead of being rounded, the upper ventral plate now has a central triangular depression, in the bottom of which is set a short movable spine. This space is dusky yellow. The lower ventral plate has a depression on each side of a rounded longitudinal ridge, with the bottom confusedly punctured. Edge of both plates set sparsely with strong, black setæ. Length .84.

June 12. Seventh stage.—Much as before. Body strongly wrinkled. Thoracic legs and antennal appendages now translucent greenish, ringed lightly with black at the joint. Length, 1.15.

June 14. Eighth stage.—Not changed, except that the thoracic legs are ringed with orange. The tubercles on the 11th segment have increased in size with later moults, but none others seem prominent. Length, 1.35.

After feeding two days without further moult, the larvæ as they mature turn a deep green, except the head and anal plates, which remain shining black, feet translucent. At this time they drop from the web and enter the ground for æstivation, there being in our section a spring and fall

brood. These larvæ, if placed on any flat surface, turn on their backs and begin at once to web the body fast to it, pushing themselves along under the web with the aid of the folds of the body and the jointed appendages of the anal plates. From my observations I believe this to be the purpose for which these appendages are supplied, supplemented at later stages, when its body becomes heavier, by the spinous process placed on the *upper* anal plate. After falling from the web and seeking to enter the ground, it assumes the normal position, hitching itself along on its ventral surface with the aid of its head and thoracic legs.

Some of the larvæ of the 1901 brood remain unchanged in their cell at this date, June 16th, and, I presume, will not appear as imagoes until the autumn, thus insuring, as do lepidopterous larvæ, a perpetuation of the species.

LARVA OF DATANA FROM ARIZONA IDENTIFIED.

In the March number of THE CANADIAN ENTOMOLOGIST, page 74, I described a, to me, unknown larva, which, according to a statement of Mr. Wm. Beutenmuller, of the American Museum of Natural History of New York, is that of *Datana robusta*, Strecker. Heretofore the imagoes of D. robusta had all been taken in Texas, and Dr. Dyar in Prof. Packard's *Bombycine Moths*, Vol. I., page 120, is quoted as saying that the larva of *Robusta* was yet unknown. Some have claimed that the species described as *Robusta* too much resembled *Perspicua*, but it will be seen that the larva is distinct, and the imagines of both these species are entitled to the names as first described. The body colour of Robusta larva is *black*, and the lines are *yellow*. Perspicua larva has a body of *straw* or *lemon yellow* and eleven *pitchy reddish* lines in the 3rd or 4th stage, and in the 5th stage the body is of the same colour, but the lines are *blackish red*, according to Mr. James Angus. In the third stage of Perspicua larva, as described by Dr. Dyar, the body colour is *dark red* and the stripes *bright yellow*.

Mr. Beutenmuller wishes it to be known that he alone is responsible that these two larvæ were not turned over to Mr. L. H. Joutel for figuring. He was on the point of departing from the city, and the larvæ having already contracted, he did not think they would then serve the purpose.

R. E. KUNZE, Phœnix, Arizona.

NOTES ON CICINDELÆ IN NORTH CAROLINA.

BY EDWARD D. HARRIS, NEW YORK.

In the early part of May of the present year (1902) the writer made an attempt to collect Cicindelæ in the pine belt of North Carolina. While opportunities for observing the distribution of species were too meagre to be of much practical value, certain facts were noted that may be of interest to those studying the genus.

The first locality visited was Jamestown, a station on the line of the Southern Railway, distant about 220 miles from the coast and 40 from the Virginia line. On the sand bars and banks of Deep River, a tributary of Cape Fear River, beautiful specimens of *repanda* were taken in abundance. A single *duodecimguttata* and a single *vulgaris* of the typical size were taken on the same ground, and a few specimens of *sexguttata*, both six- and eight-spotted, on sandy paths along the wooded banks of the river.

At High Point, in the woods eight miles distant, *repanda*, *sexguttata* and *vulgaris* occurred, a single specimen of the latter being noticeable for its small size. Charlotte, the next point visited, 15 miles from the South Carolina line, afforded in its suburbs excellent collecting ground. Along the edges of a creek of formidable dimensions, that showed unmistable evidences of often breaking through its bounds, *repanda* and *duodecimguttata* were taken, the former in an unusual range of size. Here also occurred *vulgaris* in abundance, most of the specimens in both sexes being so small as to warrant special notice. Many of the males were scarcely larger than the typical *repanda*, and the average in size falls so far below that of the species as generally noted as to indicate the existence here of a sub-race. The maculations are noticeably attenuated, and in some of the specimens there appears a distinct tendency to their obliteration. The humeral lunule is generally either broken or the anterior portion wholly absent.

The three collecting points heretofore noted are west of, and not to be considered as included in, the pine belt of the State. Hamlet, 75 miles to the east of Charlotte, and less than 10 miles from the South Carolina line, is in the heart of the turpentine lands. Here the pine timber abounds—forests of magnificent trees, free from underbrush and plentifully watered.

At this point a most interesting form of *C. scutellaris* was taken. In colour it is somewhat suggestive of *rugifrons*, but, while being unicolorous, is not so intense a green or blue. The maculations, however, differ

from *rugifrons*. In the majority of specimens taken there is an apical lunule well defined, and sometimes the marginal dot appears. Other specimens are immaculate, and, were it not that they occur with those that are marked, would be placed as *C. unicolor*.

Vulgaris and *repanda*, the former of the typical size, were also taken at this locality.

In passing from Hamlet to the seacoast, 115 miles, one journeys directly through the pine district, which extends nearly the whole distance. There is little doubt that this form of *C. scutellaris* can be taken at numerous points over the entire field. At Montague, 17 miles from the coast, on sandy patches beneath the pine trees, although the weather was unfavourable, two specimens of the same insect were taken, having the apical lunule and small marginal dot.

Vulgaris was common here, the larger number of specimens being of the normal size.

The ocean beach opposite Wilmington was wholly bare of the genus.

Goldsboro' was the last collecting point on the trip. *Sexguttata* was taken here in the woods for the only time since leaving High Point. It appears to be absent in the pine belt. Here also occurred *modesta* and *vulgaris*, both in the roads, the latter of the dwarfed form found at Charlotte.

BOOK NOTICE.

THE COMMON SPIDERS OF THE UNITED STATES.—By J. H. Emerton; Ginn & Co., Boston, Mass., 1902; 8vo., pp. 225, figs. 501.

This is a most welcome addition to the few books on the spiders of the United States. It is based on the author's previous papers on the New England spiders that have appeared during the past twenty years in the Transactions of the Connecticut Academy. Some species from the Southern States have been added, so that the work describes about 200 of the commoner spiders of the North-eastern United States, and Canada. There is an excellent introduction, which we wish were longer, and a short, general treatment of each family. Under the family each species is described in simple yet distinct language, and each species is figured. The abundance and excellence of these figures greatly enhance the value of the book, and make the determination of many of our common spiders a very easy matter. There are also many fine photographs of spider-webs, which indicate, as only photographs can, the beauty and complexity of these delicate structures. The classification adopted is that used by Blackwall many years ago, and the generic and specific names are sometimes out-of-date. The book is nicely gotten up, well printed, and with an appropriate cover-design representing a remarkable new genus of blind Thomisidæ. NATHAN BANKS.

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The Canadian Entomologist.

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CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, A. M., ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 8.—Continued from p. 210.)

Family XXX.—Masaridæ.

Prof. Westwood and others confused these wasps with the Vespidæ and the Eumenidæ, although Latreille had years previously established his family Masarides. Henry de Saussure, in his "Etudes," treats them as a tribe. They, however, represent a distinct family close to the Eumenidæ, but easily separated from them and the Vespidæ by the wings not being folded longitudinally, by peculiarities of the antennæ, which are usually strongly clavate at tip; by the wholly different abdomen, the venter being flatter; and by the much larger scutellum.

Of the habits of the Masarides nothing seems to be positively known. Some years ago Dr. Dyar gave me specimens of *Masaris vespoides*, Cr., bred from what I take to be the nest of an Odynerine, taken in Arizona.

Table of Genera.

1. Front wings with *two* cubital cells (Masarini) .... 3.
   Front wings with *three* cubital cells (Euparagiini) .... 2.
2. Second cubital cell receiving both recurrent nervures; antennæ in ♀ short, clavate, ♂ unknown; scape not long ..... (1) Paramasaris, Cameron.
   (Type P. fuscipennis, Cam.)
   Second and third cubital cells each receiving a recurrent nervure; antennæ not clavate in both sexes, in ♂ subfiliform; scape very long .... (2) Euparagia, Cresson.
   (Type E. scutellaris, Cress.)

3. Labrum extensible ..... 8.
Labrum *not* extensible.
Maxillary palpi wanting or rudimentary, or 3-jointed ..... 7.
Maxillary palpi *not* rudimentary, 4- to 6-jointed; labial palpi 4-jointed 4

4. Maxillary palpi 4-jointed ..... 5.
Maxillary palpi 6-jointed. Labial palpi stout, the last three joints united scarcely as long as the first; claws with a strong tooth beneath; mandibles 3-dentate ..... (3) Paragia Shuekard.
(Type P. decipiens, Shuck.)

5. First abdominal segment small; clypeus in ♂ transverse ..... 6.
First abdominal segment nearly as long as the second; clypeus in ♂ longer than wide; mandibles obliquely truncate, 3- or 4-dentate ..... (4) Paraceramius, Saussure.
(Type P. spiricornis, Sauss.)

6. Abdominal segments *not* constricted at base; marginal cell *with* an appendage, the second cubital cell about twice as long as wide ..... (5) Ceramius, Latreille.
(Type C. Fonscolombei, Latr.)

Abdominal segments constricted at base as in the genus *Cerceris*, Latr.; marginal cell *without* an appendage ..... (6) Ceramioides, Saussure.
(Type C. cerceriformis, Sauss.)

7. Second cubital cell subquadrate, not or scarcely longer than wide.
Labial palpi 4-jointed; labium long; maxillary palpi rudimentary, 3-jointed; mandibles rather short and acute; claws unidentate ..... (7) Jujurtha, Saussure.
(Type Celonites oraniensis, Lepel.)

Labial palpi 3-jointed; labium short, bifid; maxillary palpi wanting; mandibles somewhat acute at apex; claws simple ..... (8) Trimeria, Saussure.
(Type T. Americana, Sauss.)

8. Marginal cell *with* an appendage ..... 10.
Marginal cell *without* an appendage.
Eyes in ♂ normal, the lateral ocelli away from the eye margin .. 9.
Eyes in ♂ abnormal, very strongly converging above or holoptic, the lateral ocelli touching the eye margin (♀ unknown).

Scape large, globular, the pedicel annular; flagellum very long, terminating in a large club, joints 1 to 5 elongate, slender, cylindrical, the first joint shorter than either joints 2 or 3 ..... Masaris, Fabr. (partim).
(?) ♂ M. Texana, Cr., (?) g. nov.

9. Scape and pedicel large, globular, nearly equal; first joint of flagellum longer than either 2 or 3; labium long; maxillary palpi rudimentary, 3-jointed; mandibles short and acute; first joint of hind tarsi *not* as long as all the other joints united; claws with a tooth ..... (9) Celonites, Latreille.
(Type Vespa abbreviata, Villers.)

Scape elongate, the pedicel small; flagellum in ♂ elongate, joints 2 to 6 elongate, cylindrical, subequal, in ♀ short, the first joint as long as 2–4 united, the latter being very short; first joint of hind tarsi elongate, as long as all the following united; claws simple, *without* a tooth ..... (10) Masaris, Fabricius.
(Type M. vespiformis, Fabr.)

10. Scape not elongate, hardly thrice as long as thick, the pedicel annular; first joint of flagellum in ♀ as long as joints 2–3 united, in ♂ with joints 1 to 4 elongate; first joint of hind tarsi a little longer than all the following joints united, the second and third only a little longer than thick; claws long, simple ..... (11) Pseudomasaris, Ashmead, g. nov.
(Type Masaris occidentalis, Cress.)

Scape elongate, about four times as long as thick, the pedicel hardly longer than thick; first joint of flagellum in ♀ not longer than 2–3 united; first joint of hind tarsi shorter than all the following joints united; claws very small .. .. (12) Quartinia, Gribodo.
(Type Q. dilecta, Gribodo.)

Family XXXI.—Chrysididæ.

1825. Chrysides, Cinquieme Tribe, Latreille. Fam. Nat. Regn Anim., p. 448.
1830. Chrysides, Tribe VIII., Leach. Edinb. Ency., IX., p. 146.
1839. Chrysidæ, Fam. 18, Haliday. Hym. Syn., p. ii.
1845. Chrysidiformes, Dahlbom. Hym. Eur., II., p. 2.
1877. Chrysostilba, Tribe 13, Förster. Ueber d. Syst. Werth d. Flügelg. bei den Hym., p. 20

Abroad, the wasps belonging to this family are known as "ruby-tailed flies" and "gold-wasps."

Cuckoo wasps is a better name for them. They are among the handsomest of all wasps, being most frequently of a brilliant metallic green, blue-green, blue, purplish or cupreous; they are rarely wholly black, and still more rarely variegated with yellow or testaceous.

All the species are parasitic or inquilinous, principally in the nests of bees and wasps. The potter-wasps (*Eumenidæ*) and the leaf-cutting bees (*Megachilidæ*, subfamily Osmiinæ) are especially subject to their attacks; they have also been bred from the nests of other bees and wasps, and a few are said to have been bred from the larvæ of sawflies (Tenthredinoidea).

Dahlbom was among the first to separate the family into groups, which he called families. He established six families: (1) *Cleptidæ*, (2) *Elampidæ*, (3) *Hedychridæ*, (4) *Chrysididæ*, (5) *Euchrœidæ*, and (6) *Parnopidæ*. All of these, except the *Euchrœidæ*, are natural groups, recognized to-day as subfamilies, and he, and not Aaron and Mocsary, should receive credit for first pointing them out.

In 1889 an excellent monograph of this family, entitled "Monographia Chrysidarum orbis terrarum universi," was published by Alexander Mocsary, at Buda-Pesth, Hungary. It is a large 4to, of 643 pages, illustrated with two plates, gives a full bibliography of the family, tables for recognizing the subfamilies and genera, and terminates with a list of the hosts from which these wasps have been bred. It is the best work ever published on the family, and will be found indispensable to the student.

Mocsary, in this work, recognized *seven* subfamilies: (1) *Amiseginæ*, (2) *Cleptinæ*, (3) *Allocoelinæ*, (4) *Ellampinæ*, (5) *Hedychrinæ*, (6) *Chrysidinæ*, and (7) *Parnopinæ*.

In 1890, after this work had been published, Mocsary established another subfamily, the *Adelphinæ*, based upon a Mexican genus, *Adelphe*, placing it next to the *Amiseginæ*. In my opinion this subfamily does not represent a natural group, and I have here merged it with the *Cleptinæ*.

It will also be observed that I have not followed Mocsary in his arrangement of the subfamilies. My reasons for this are simple. I believe the family *Chrysididæ*, through the *Cleptinæ* and the *Amiseginæ*, is quite closely allied to the family *Bethylidæ*, and by the arrangement here proposed, a very natural transition into this family is shown. The *Parnopinæ*, although very far removed, appear to me to approach nearest

to the *Masaridæ* and the *Eumenidæ*, and hence I begin with them, rather than with the *Amiseginæ*, as Mocsary has done.

This paper was ready for publication when I received the July No. of Zeitchr. f. Hym. u. Dipt., in which Mr. Adolphe Ducke has established a new subfamily, the *Pseudepyrinæ*, based upon a new genus discovered in Brazil.

This subfamily, judging from the description alone, is hardly justifiable, all the characters given, except those of the abdomen, agreeing with the *Allocoelinæ*, and I have here merged it with that subfamily.

Table of Subfamilies.

Face more or less convex, never concave; prothorax quadrate, subtrapezoidal or longer than wide, and as long or longer than the mesonotum; abdomen depressed, subconvex or convex beneath, the female with 2 or 4 dorsal segments, the male with 4 or 5 segments ..... 3.

Face more or less concave; prothorax transverse quadrate or rectangular, shorter than the mesonotum; abdomen concave beneath, with 3 dorsal segments, rarely with 4 segments in some males.

Maxillæ and labium normal, the ligula subconical, the galea rounded, obtuse ..... 2.

Maxillæ and labium abnormal, the ligula and galea very long, produced into a slender, filiform beak, resembling the proboscis of bees, and bent back under the thorax in repose; front wings with the discoidal cell distinct; abdomen in ♀ with 3, in ♂ with 4 segments, the last *without* pits or foveolæ, but with a broad deep submarginal furrow on each side of the apical half; apex of abdomen irregularly denticulate ..... Subfamily I.—Parnopinæ

2. Third abdominal *with* a submarginal series of pits or foveolæ, contained in a groove or declivity, the apical margin rarely unarmed, most frequently angulate, dentate or serrate; front wings with a distinct discoidal cell; claws simple ... Subfamily II.—Chrysidinæ.

Third abdominal segment *without* a submarginal series of pits or foveolæ in a groove or declivity, the surface therefore entire, smooth; front wings with the discoidal cell frequently wanting or incomplete; claws bifid, serrate or pectinate.

Front wings with the first and second discoidal cells usually more or less present and complete, or at least indicated by fuscous lines; apical margin of the last dorsal segment entire, very rarely undulate or more or less angulate laterally.....Subfamily III.—Hedychrinæ.

Front wings with the first and second discoidal cells wanting, rarely with the second indicated by water lines; apical margin of the last dorsal segment medially excised or truncate—emarginate, rarely entire or subsinuate, scarcely excisely *(Philoctetes)* .....Subfamily IV.—Elampinæ.

3. Metathorax unarmed, the hind angles rounded.....4.

Metathorax with the hind angles acute or toothed; pronotum usually longer than wide, narrowed anteriorly, rarely quadrate.

Pronotum *without* a transverse furrow anteriorly; abdomen in ♀ with 2 or 3 dorsal segments, the apical margin of the last rounded, edentate; claws with one tooth beneath.....Subfamily V.—Allocoelinæ.

Pronotum *with* a transverse furrow anteriorly; abdomen in ♀ with 4 dorsal segments, in ♂ with 5 segments.....Subfamily VI.—Cleptinæ.

4. Pronotum broad, quadrate or subtrapezoidal, usually as long as the mesonotum, rarely a little shorter; abdomen much depressed, the known forms with 4 or 5 distinct dorsal segments.....Subfamily VII.—Amiseginæ.

Subfamily I.—Parnopinæ.

The abnormally lengthened labium and maxillæ, as well as the venation of front wings and the peculiarities of the abdomen, render the subfamily easily recognized.

It is represented at present by a single genus, and all of the species apparently confine their attacks to wasps belonging to the family *Bombicidæ*.

Abdomen in ♀ with 3 segments, in ♂ with 4 segments, the terminal segment minutely denticulate at apex; postscutellum lamelliform, projecting; labium and maxillæ abnormally long ..... Parnopes, Latreille.

(Type Chrysis grandior, Pallas.)

Subfamily II.—Chrysidinæ.

This is the largest and most extensive group in the family. It is easily recognized by the simple, edentate claws, by the front wings having

a distinct discoidal cell, and by the abdomen, which is composed of only 3 visible segments, the third segment always having a groove or declivity before its apex, which is filled with pits or foveolæ, the margin being usually dentate or serrate, rarely simple or unarmed.

The wasps of this subfamily attack principally bees belonging to the families *Anthophoridæ*, *Megachilidæ*, *Andrenidæ* and *Panurgidæ*, and wasps of the family *Eumenidæ*; they also attack those of the families *Pemphredonidæ*, *Philanthidæ*, *Larridæ*, *Sphecidæ* and *Scoliidæ*.

Chryaspis, Saussure, described from Africa, I do not know, nor can I find out where it is described, the Zoological Record, and Dalla Torre, in his catalogue, being deficient in citing the publication. Both give Soc. Entom., II., 1887, p. 25. What entomological society?

Table of Genera.

Head normal, not rostriform; postscutellum normal, the basal part *not* covered by the scutellum.....2.

Head rostriform, the frons narrowed; postscutellum conically produced, the basal part wholly covered by the scutellum.

Postscutellar process excavated; third joint of antennæ *longer* than the fourth.....(1) Stilbum, Spinola.
(Type Chrysis cyanura, Forster.)

Postscutellar process not excavated, convex; third joint of antennæ usually distinctly *shorter* than the fourth.....(2) Pyria, Lepeletier.
(Type Chrysis lyncea, Fabr.)

2. Apical margin of the third dorsal abdominal segment normal, or *without* a pellucid or subcoriaceous membrane.....3.

Apical margin of the third dorsal abdominal segment abnormal, composed of a pellucid or subcoriaceous membrane.....(3) Spintharis, Klug.
(Type S. chrysonota (Klug.), Dahlb.)

3. Front wings *with* a complete discoidal cell.....4.

Front wings *without* a complete discoidal cell.....8.

4. Antennæ, legs and tibial spurs normal.....5.

Antennæ, legs and tibial spurs abnormal.

Apical margin of the third abdominal segment 6-dentate; antennæ with the joints of the flagellum dilated.....(4) Pleurocera, Guerin.
(Type P. viridis, Guerin.)

5. Apical margin of third abdominal segment *not* finely denticulate, entire, notched, or terminating in from one to seven teeth....6.
Apical margin of third abdominal segment finely denticulate or with many teeth.
Front wings with an *incomplete* marginal cell.
Mesopleura bispinose.....(5) Euchrœus, Latreille.
(Type Chrysis purpurata, Fabr.)
Mesopleura normal, unarmed.....Spinola, Dahlbom.
Front wings with a complete marginal cell.
Apex of abdomen with 11 small teeth.....(6) Polydontus, Radoszkowski.
(Type P. Stschurovskyi, Radosz.)

6. Apex of abdomen not terminating in a tooth, entire, undulate, notched or angulate.....7.
Apex of abdomen terminating in from one to seven teeth.
Apical margin of third abdominal segment terminating in 7 teeth.....(7) Heptachrysis, Mocsary.
(Type Chrysis festina, Smith.)
Apical margin of third abdominal segment terminating in 6 teeth.....(8) Chrysis. Linné.
(= Hexachrysis, Licht.)
(Type Chrysis ignita, Linné.)
Apical margin of third abdominal segment terminating in 5 teeth.....(9) Pentachrysis, Lichtenstein.
(Type Chrysis amœna, Eversm.)
Apical margin of third abdominal segment terminating in 4 teeth.....(10) Tetrachrysis, Lichtenstein.
(Type Chrysis aeruginosa, Dahlb.)
Apical margin of third abdominal segment terminating in 3 teeth.....(11) Trichrysis, Lichtenstein.
(Type Chrysis cyanea, L.)
Apical margin of third abdominal segment terminating in 2 teeth.....(12) Dichrysis, Lichtenstein.
Apical margin of third abdominal segment terminating in a single central tooth.....(13) Monochrysis, Lichtenstein.
(Type Chrysis hybrida, Lepel.)

7. Apical margin of third abdominal segment undulate, notched or angulate.....(14) Gonochrysis, Lichtenstein.
(Type Chrysis albipennis, Klug.)

Apical margin of third abdominal segment entire.....(15) Olochrysis, Lichtenstein.
(Type Chrysis aerata, Dahlb.)

8. Body narrow, slender.....(16) Chrysogona, Förster.
(Type C. gracillima, Förster.

Subfamily III.—Hedychrinæ.

This group is closely allied to the Elampenæ, where Aaron placed it, and probably the slight difference in venation used by Mocsary will not always prove satisfactory. The characters of the claws given by Dahlbom are entirely worthless to separate these wasps from the *Elampinæ*.

The third abdominal segment is always normal, *without* a groove or declivity filled with a submarginal series of pits or foveolæ, and this character separates the group from the *Chrysidinæ*; while from the *Elampinæ* it is usually easily distinguished by the venation of the front wings, the first and second discoidal cells being usually distinct, complete.

The wasps of this subfamily are most frequently bred from the nests of the *Pemphredonidæ* and *Trypoxylidæ*, although they attack other wasps, *Philanthidæ*, *Stizidæ*, and *Sphecidæ*. A few are also recorded from bees, *Megachilidæ*, *Andrenidæ*, *Panurgidæ*, etc.

Table of Genera.

1. Submedian cell *not* longer than the median, the transverse median nervure interstitial with the basal nervure. .....2.

Submedian cell longer than the median, the transverse median nervure originating beyond the basal nervure.

Claws with 4 or more teeth beneath; first and second discoidal cells distinct or indicated by fuscous nervures.....(1) Holopyga, Dahlbom.
(Type H. amœnula, Dahlb.)

2. Claws with one small tooth beneath, at or near the middle; abdomen with the third segment at apex entire or broadly sinuate.....(2) Hedychridium, Abeille.
(Type Chrysis ardens (Latreille), Coquebert.)

Claws cleft or bifid; abdomen with the third segment laterally rather strongly sinuate, and appearing more or less distinctly angulate .....(3) Hedychrum, Latreille.
(Type Sphex nobilis, Scopoli.)

SUBFAMILY IV.—Elampinæ.

This group could only be confused with the *Hedychrinæ*, the only available character to separate it from that group, and probably not a reliable character, being the apparent absence of discoidal cells in the front wings. I have examined many specimens, and in nearly all I can clearly detect these cells by hyaline veins, when examined through a bright light.

Table of Genera.

Postscutellum seen from the side gibbous, convex, subconvex or obtusely produced, rarely subconical..... .....2.

Postscutellum seen from the side acuminately produced into a depressed blade or ledge.

Front femora towards base rectangularly dilated; abdomen with the third segment at apex medially most frequently strongly narrowed, reflexed and truncate; claws with 3–6 teeth.... .....(1) Notozus, Förster.
(Type Hedychrum spina, Lepel.)

2. Posterior tibiæ normal..... .....3.

Posterior tibiæ in ♂ dilated, compressed.

Abdomen with the third segment at apex undulate or rounded centrally, almost entire, very slightly sinuate, scarcely incised; pronotum declivous before; claws with 3 teeth..... .....(2) Philoctetes, Abeille.
(Type Elampus micans, Klug.)

3. Abdomen with the third segment at apex medially *not* truncate, and, viewed laterally, not forming a snout-like projection.....4.

Abdomen with the third segment at apex medially truncate, and, as viewed laterally, forming a snout-like projection that appears truncate; seen from behind, it is usually incised or emarginate below.

Surface of the third segment, just above the snout-like projection, produced into a cone-shaped piece forming the direct apex of

a fold which extends on each side just above the apical and lateral margins; claws with 2–3 teeth within.....(3) Diplorrhos, Aaron.
(Type D. plicatus, Aaron.)

Surface of the third segment, above the snout-like projection even, *not* produced; claws with two or more teeth; pronotum nearly regularly convex.....(4) Elampus, Spinola.
(Type Sphex auratus, Linné.)

4. Abdomen with the third segment at apex medially more or less distinctly excised; claws with 3–8 teeth beneath.....(5) Pseudomalus, Ashm., g. nov.
(Type Omalus semicircularis, Aaron.)

Abdomen with the third segment at apex rounded, entire; claws with 3 teeth beneath.....(6) Holophris, Mocsary.
(Type H. marginellus, Mocs.)

Subfamily V.—Allocœlinæ.

This subfamily was established by Mocsary. It is allied to the *Cleptinæ*, but is easily distinguished by the absence of a transverse furrow on the pronotum, by the paucity of visible segments in the abdomen, there being only two or three, and by the claws, which are armed with a tooth beneath.

Ducke's recently-established subfamily *Pseudepyrinæ* seems to fall in here.

In the character of the pronotum, the group shows some affinity with the *Amiseginæ*, but from that group it is easily separated by the unidentate claws, the armed metathorax, and by the totally different shaped abdomen.

Table of Genera.

Pronotum twice wider than long; abdomen with three segments, the last with a finely elevated apical margin..(1) Pseudepyris, Ducke.
(Type P. paradoxa, Ducke.)

Pronotum longer than wide, trapezoidal; abdomen with only two visible segments, the last with the apical margin rounded, edentate.....(2) Allocœlia, Mocsary.
(Type Anthracia capensis, Smith.)

Subfamily VI.—Cleptinæ.

The acute or toothed hind angles of the metathorax separate this subfamily from the *Amiseginæ*, while from the *Allocœlinæ*, to which it is most closely allied, it is separated by the pronotal differences, the pronotum in this group always being divided by a transverse furrow anteriorly.

In venation the group is practically identical with many forms in the family *Bethylidæ*, and this resemblance is so striking that quite recently an eminent French hymenopterist classified *Heterocœlid*, Dahlbom, with the *Bethylidæ*.

All the species bred are recorded from the larvæ of sawflies *(Nematidæ)*.

Table of Genera.

Front wings with the first and second discoidal cells *distinct*, complete . . . . . 2.

Front wings with the first and second discoidal cells *wanting* or incomplete . . . . . 3.

2. Eyes large, oval; antennæ *not* inserted on a tubercle; clypeus without a prominent carina; scutum of metathorax visible . . . . . (1) Cleptes, Latreille. (Type Sphex semiaurata, Linné.)

Eyes small, rounded; antennæ inserted on a small tubercle; clypeus with a strong prominent carina its entire length; scutum of metathorax wanting . . . . . (2) Heterocœlia, Dahlbom.

3. Pronotum quadrate, with a transverse arcuate furrow anteriorly; claws with a median tooth beneath . . . . . (3) Adelphe, Mocsary. (Type A. mexicana, Mocsary.)

Subfamily VII.—Amiseginæ.

This small group is known at once by the metathorax being unarmed, the hind angles being always rounded, never acute. The pronotum is broad, quadrate, or nearly, usually wider than long, and as long as the mesonotum or a little shorter. The abdomen is much depressed, oval, the known forms having 4 or 5 distinct dorsal segments.

The species can be easily confused with genuine Bethylids, and the connection between these insects and the family *Bethylidæ* is very close.

Table of Genera.

Front wings with two discoidal cells, or at least these are indicated by fuscous streaks ; antennæ 13-jointed.

Pronotum as long or a little longer than the mesonotum, the latter without parapsidal furrows, but with a grooved line at sides just above the tegulæ ; abdomen with 5 visible dorsal segments ; marginal cell open at apex ; discoidal cells usually incomplete, indicated by fuscous streaks.....(1) Mesitiopterus, Ashmead, n. g. (Type M. Kahlii, Ashm.)

Pronotum shorter than the mesonotum, the latter with parapsidal furrows ; abdomen with 4 visible segments ; marginal cell closed ; discoidal cells distinct.....(2) Amisega, Cameron. (Type A. cuprifrons, Cam.)

Mesitiopterus Kahlii, n. sp.

♂.—Length 3 mm. Head and thorax bronzed green, punctate, the metanotum smooth, with a median carina ; scape, pedicel and legs, except the middle and hind coxæ, rufous ; abdomen black, the first segment at apex and the large second segment, except at apex, minutely punctate. Wings hyaline, the subcostal vein and the stigma brown-black, the other veins testaceous ; the venation is as in the Bethylid genus *Mesitius*, Spinola, and is also much as in *Cleptes*, Latr.; there are two indistinct discoidal cells represented by slight fuscous streaks.

Type.—Cat. No. 6343, U. S. N. M (Ashmead collection).

Hab.—Kansas, Lawrence. Taken by Mr. Hugo Kahl, July 7, 1896.

Mesitiopterus Townsendi, n. sp.

♂.—Length 2 mm. Head and thorax aeneous black, punctate ; scape of antennæ obclavate, aeneous black, the flagellum dull black ; tips of front and middle tibiæ and their tarsi, except at apex, testaceous, the hind tarsi fuscous, testaceous basally and beneath. Abdomen aeneous black, punctured very nearly as in *M. Kahlii*. Wings subhyaline, hyaline basally, the venation as in previous species.

Type.—Cat. No. 6344, U. S. N. M (Ashmead collection).

Hab.—Mexico, San Rafael, Jicoltepec (Prof. Tyler Townsend).

ON THE TYPE OF THE GENUS COCCUS, L.

BY MRS. C. H. FERNALD, AMHERST, MASS.

The first attempt to separate the species given under *Coccus* in the 10th edition of the Systema Naturæ of Linneus, was made by Geoffroy, in his Histoire Abregée des Insectes, Vol. I. (1762), where he placed a part of them under *Chermes* and left *adonidum* and *phalaridis*, with his new species *ulmi*, under *Coccus*. Of these species only *phalaridis* was given under the genus *Coccus* by Linneus in his 10th edition, and is therefore the only species that could be regarded as the type of *Coccus* so far as Geoffroy is concerned.

In 1802, Latreille, in Vol. III., p. 267, of his Hist. Nat. Crust. Ins., established *hesperidum* as the type of the genus *Coccus*. I have not been able to find that any of the writers between the appearance of the work of Geoffroy and that of Latreille published anything that would fix the type of *Coccus*. Leach in 1815 and Samouelle in 1819 adopted *cacti* as the type, but the statement made by Leach that it "inhabits fruit trees" makes it quite certain that he had under consideration neither *cacti*, L., nor the cochineal insect. Samouelle merely copies Leach. Curtis, in his British Entomology (1838), gives *cacti*, L., as the type, but none of these three authors could affect the question, as the type had already been established by Latreille, if not by Geoffroy, as shown above.

The *phalaridis* of Linneus was so obscure an insect that the author himself could not determine whether it was a *Coccus*, an *Aphis* or a *Chermes*. Fonscolombe, in describing his *Coccus radicum graminis* (Ann. Soc. Ent. Fr. III., 212, 1834), gave the synonymy as follows: *Phalaridis (?)*, Linn., Fab., non *C. phalaridis*, Enc. Meth. nec Geoffr. Prof. Cockerell has suggested the idea that the *phalaridis* of Geoffroy was possibly not the same species as the Linnean insect, which is precisely the same idea that Fonscolombe had, as shown by his synonomy. Since it is probably impossible to prove that Geoffroy had any of the Linnean species of the 10th edition in his restricted genus, the only safe ground will be to adopt the type established by Latreille in 1802, at least till further light is obtained on the identity of *phalaridis*, L., which at present is unknown.

If, therefore, we adopt *hesperidum* as the type of *Coccus*, the genera *Calymnatus* and *Calypticus* of Costa and *Lecanium* of Burmeister will fall

as synonyms of *Coccus*, and a new subfamily name will have to be substituted for *Lecaniinæ* and also for the subfamily now called *Coccinæ*.

The species *cacti*, L., as has been shown by Prof. Cockerell, is a *Monophlebus* and must be known by the name of *Monophlebus cacti*, L. This insect, so far as can be learned from the writings of those who are known to have had this species before them for study, does not possess colouring matter. When Fabricius and others simply copy the description of Linneus without changing it in any way we must consider it as pertaining to the Linnean species only, but when they add to that description the word "tinctorium," as Fabricius does in some of his later writings, we must conclude that he has confounded the cochineal insect with the Linnean species which has the following synonomy:

Coccus cacti, Linn., Syst. Nat., Ed. X., Vol. I., p. 457 (1758).

Coccus cacti, Linn., Syst. Nat., Ed. XII., Vol. I., p. 742 (1766).

Coccus cacti, Fab., Syst. Ent., p. 744 (1775).

Coccus cacti, DeGeer, Ins. Vol. 6, p. 447 (1776).

Coccus cacti, Fab., Spec. Ins., Vol. II., p. 395 (1781) in part.

Coccus cacti, Gmel., Syst. Nat., Ed. XIII., Vol. I., part IV., p. 2220 (1788–93) in part.

Coccus cacti, Fab., Ent. Syst., Vol. IV., p. 227 (1794) in part.

Coccus cacti, Fab., Syst. Rhyng., p. 311 (1803) in part.

Monophlebus cacti, Ckll., Science, n. ser., Vol. XV., p. 718 (1902).

The cochineal insect, so long confounded with *cacti*, L., was called by the specific name of *cacti* through a misapprehension, from the time of Fabricius till Costa, in his Fauna del Regno di Napoli, Emitteri, described the species under the name of *Dactylopius coccus*, in such a manner that there can be no doubt that he was dealing with the cochineal insect. In 1833 Brandt described it very fully, with excellent illustrations, under the name of *Coccus cacti*, and, while he supposed he had the Linnean species, his description and illustrations apply only to the cochineal insect. The synonomy of this insect is too extensive to be given here, but will appear in my Catalogue of the Coccidæ soon to be published.

The leading facts in this paper were prepared at my request by my husband, Prof. C. H. Fernald, in reply to questions from Prof. Cockerell, who requested him to publish the results of his investigations on the subject, but as Mr. Fernald does not wish to publish on the Coccidæ, he has turned the matter over to me to prepare for publication.

NOTES AND DESCRIPTIONS OF BEES.

BY J. C. CRAWFORD, JR., WEST POINT, NEBR.

The specimens on which this paper is based are in the collection of the University of Nebraska, unless otherwise stated. Especial acknowledgments are due to Prof. Cockerell for specimens and suggestions, to Prof. Titus for specimens, and to Prof. Bruner for overseeing my work.

Halictus montanus, n. sp.—Female: Black, head closely coarsely and deeply punctured on the vertex, coarser along the inner orbits, less closely on the face below the antennæ; clypeus sparsely and more coarsely punctured, fringed with golden hair at the apex; mandibles black, reddish at tips; antennæ black, flagellum dark brownish beneath towards tip; pubescence of head and thorax griseous, slightly tinged with ochraceous on the thorax, thin on the disc of mesothorax, dense on pleura and cheeks; thorax closely and rather coarsely punctured; base of metathorax enclosed and finely rugose, truncation finely roughened and with large punctures; tegulæ large, testaceous, and with punctures anteriorly; wings slightly yellowish, clouded apically; nervures and stigma bright testaceous; legs black, tarsi and hind tibiæ behind ferruginous; pubescence of legs slightly ochraceous, on inner side of tarsi and hind tibiæ golden; inner hind tibial spur with many short blunt teeth; abdomen black, very finely punctured, apical margins of segments with yellowish-white hair bands, bases of segments 2–4 also showing slight hair bands; pubescence at base of first segment griseous, on discs of other segments black, not showing plainly except from the sides. Length, 12–14 mm.

Male.—Similar to the female, but with the usual narrow form of the male. Most of mandibles and labrum and anterior half of clypeus yellowish-white, that on the clypeus produced to a tooth medially at rear; femora black, front and intermediate ones with a whitish stripe anteriorly, and all knees whitish; tibiæ yellowish white, with black stripes in front and behind; tarsi yellowish-white, apical joints tinged with reddish; antennæ long, reaching the metathorax, black, dull brownish beneath. In pubescence and punctuation like the female, the punctuation much closer, however. Length, about 12 mm.

Twelve female specimens: Big Horn Mts., Wyo.; Sioux Co., Nebr.; Logan, Utah; Laramie, Wyo.; Wawawai, Wash. (R. W. Doane, coll.); Wawawai, Yakima, and Almota, Wash. (C. V. Piper, coll.).

Ten male specimens: Wawawai, Wash (C. V. Piper, coll.); East Wash.

Halictus Titusi, n. sp.—♀. Black, head shining, vertex, clypeus and supraclypeal space with sparse and large punctures; sides of face with close, large, oblique punctures or depressions; mandibles black; antennæ dark, flagellum slightly brownish; head with sparse long pubescence, on cheeks and vertex slightly tinged with ochraceous; mesothorax with a bluish reflection, smooth with sparse large shallow punctures, scutellum with similar but smaller punctures; tegulæ large, shining, punctured, dark, with a lighter centre and broad testaceous margin; base of metathorax enclosed, closely, rather finely, longitudinally striate; wings hyaline, tinged with yellowish; nervures and stigma testaceous; thorax with long griseous hair slightly tinged with ochraceous; legs black, apical joints of tarsi ferruginous; pubescence of legs slightly ochraceous; of tarsi decidedly so; inner spur of hind tibiæ with many short blunt teeth; abdomen dull, smooth, with a very few shallow punctures, almost imperceptible; apical half of segments depressed; basal margins of segments 2–4 with a broad thin band of appressed white pubescence; last segment almost covered with this pubescence. Length, about 10 mm.

Type from San Diego, Calif.

Dedicated to Prof. Titus, from whom it was received.

This species is close to *H. trizonatus*, Cress., in general appearance, but is slightly more robust, the abdominal bands thinner and more griseous, the thorax less densely punctured, the abdomen with fewer punctures, etc.

Halictus fulgidus, n. sp.—♀. Black, shining, head very closely and coarsely punctured above the level of the antennæ, more sparsely so below; clypeus and supraclypeal space sparsely punctured, the former fringed with golden hairs; mandibles black, rufous towards tips; antennæ black, toward tip dark reddish brown; pubescence of head griseous and rather scanty; mesothorax finely tessellate, densely punctured along the edges, more sparsely so on the disc; pubescence long, thin and griseous, denser on pleura; metathorax shining black, coarsely rugose, truncation with a few coarse rugæ, but very finely striate all over; tegulæ shining black, externally testaceous; wings hyaline, nervures and stigma testaceous; legs black, apical joints of tarsi ferruginous, basal joints more or less so; pubescence of legs griseous, slightly tinged with

ochraceous, on the tarsi golden ; inner hind tibial spur with four long teeth, outer pectinate ; abdomen shining, very finely tessellate, first segment sparsely and finely punctured, the remaining segments densely punctured at base, becoming more sparsely so towards rear ; bases of segments 2–4 with bands of appressed white pubescence ; abdomen with sparse white pubescence, more conspicuous at sides and at apex, where it is slightly golden ; very narrow apical margin of segments testaceous ; venter dark dull reddish-brown. Length, about 9 mm.

Twenty-three specimens, Lincoln, Nebr., Apr., on willow, plum and apricot.

Halictus Cockerelli, n. sp. — ♀. Black, head closely and finely punctured ; large and sparse on the clypeus, which is fringed with golden hairs ; flagellum of antennæ ferruginous beneath, apical joints entirely so ; face and cheeks densely clothed with white appressed pubescence ; mandibles, except tips, ferruginous ; mesothorax rather closely and very finely punctured, the surface finely roughened ; median and parapsidal grooves plain ; metathorax with fine rugæ proceeding from the base, but not reaching the apex ; wings hyaline, splendidly iridescent ; nervures, stigma and tegulæ testaceous ; second submarginal cell greatly narrowed to marginal ; third not much narrowed ; legs brownish, knees, apices of tibiæ and tarsi entirely, testaceous ; pubescence of legs griseous, of tarsi golden ; inner hind tibial spur with about four or five short, blunt teeth ; abdomen shining, finely punctured and finely transversely striate, brownish, the apical margins broadly depressed and testaceous ; basal margins of segments 2–4 with bands of appressed white pubescence ; venter dull testaceous. Length, about 5–5½ mm.

Described from five specimens collected by Prof. Cockerell at Santa Fe and Mesilia, N. M., Apr. 22nd to July, on old flower clusters of Virginia Creeper and on flowers of yellow Sisymbrium.

Dedicated to Prof. Cockerell for his many kindnesses and aid in various ways.

Halictus pictus, n. sp. — ♀. Head and thorax brassy-green ; head very strongly and closely punctured on the vertex, below the antennæ the punctures large and coarse ; clypeus and supra-clypeal space sparsely punctured, the former purplish black at apex, fringed with golden hairs ; mandibles ferruginous, dusky at base and near apex at times ; sides of face with appressed white pubescence ; antennæ with scape and flagellum above black, flagellum beneath ferruginous ; mesothorax with strong

punctures sparser on the disc, closer at the edges, tessellate all over; scutellum with smaller and sparser punctures; pleura with long white pubescence; metathorax with a few fine rugæ on base, not reaching apex; tegulæ testaceous; nervures and stigma honey colour; femora dark brownish; tibiæ more or less, and tarsi entirely, ferruginous; their pubescence white tinged with golden, inner spur of hind tibiæ with two or three long teeth; abdomen ferruginous, shining, apical segments dusky at times: the first two segments naked on the disc, other segments covered with whitish pubescence; venter ferruginous. Length, 4½–6 mm.

Twenty-seven specimens: Sioux Co., and West Point, Holt Co., Nebr., on wild and cultivated Rose, and Mentzelia, June 10th to July 8th.

Differs from *H. Kunzei* in the mesothorax, not smooth centrally, the abdomen not black apically, and well clothed with pubescence, etc.

Halictus Bruneri, n. sp.—Head and thorax brassy green, pleura more olive green; head coarsely and closely punctured; clypeus with coarser and sparser punctures and black apically: mandibles ferruginous anteriorly; antennæ black; sides of face and cheeks with thin whitish pubescence; mesothorax anteriorly coarsely rugose, elsewhere very coarsely and rather closely punctured; pleura coarsely rugose; metathorax coarsely rugose, truncation with a salient rim and rugose; legs black, hind with ferruginous; all tarsi ferruginous and apices of tibiæ and knees ferruginous; wings hyaline, very slightly dusky, nervures and stigma dark testaceous: tegulæ dark brown, anteriorly punctured; abdomen black, shining, covered with appressed ochraceous pubescence, except discs of segments one and two.

Four ♀: West Point, Nebr., June 7–10, 1901, on rose and honeysuckle. Types in the author's collection.

Halictus rugosus, n. sp.—♀. Head and thorax greenish blue, thinly clothed with pale pubescence, slightly ochraceous on the vertex and dorsum of mesothorax, and longer on the cheeks and pleura; head behind the eyes finely roughened, in front coarsely and confluently punctured and also tessellate; less closely punctured below the antennæ; clypeus sparsely and very coarsely punctured, blackish anteriorly; supra-clypeal space finely punctured and tessellate: mandibles black, reddish medially; antennæ black, the flagellum dull brownish beneath apically; mesothorax finely roughened, the disc very coarsely and rather sparsely punctured, the sides and rear very coarsely reticulated, as is also the

scutellum; pleura of mesothorax coarsely reticulated, of metathorax coarsely striated; metathorax coarsely longitudinally striate, bordered apically by a rough irregular carina; tegulæ dark, shining, with a light centre and a testaceous border; wings slightly dusky, stigma and nervures brown; legs black, the pubescence griseous, that on the inside of the tarsi golden, and more or less so on the outside; outer hind tibial spur pectinate, the inner one with three teeth, the last one small; abdomen black, polished, first segment impunctate, second finely punctured at base, that and the remaining segments finely transversely striate on the depressed apical margins; segments two and three with slight basal lateral spots of pale pubescence; all segments but first covered with sparse pubescence, more dense apically; pubescence along the anal rima slightly ochraceous; venter black, the segments tessellate, with large punctures, each bearing a hair; margins of ventral segments testaceous. Length, 6 mm.

♂.—Similar to the female in colour and sculpture, but the face more brassy, the reticulations of the mesothorax finer and the punctures sparser; head much broader than in the female and the clypeus cocked-hat shaped, with fine punctures; mandibles long, slender, ferruginous except the black base; antennæ long, testaceous beneath the flagellum; cheeks produced to a spine beneath; wings and nervures darker; legs black, tarsi and base of hind tibiæ testaceous; abdomen lacking the hair patches of the female. Length, 7 mm.

One female, two male specimens, Nebraska City, Nebr., Sept. 12th, 1901, on Solidago. (M. A. Carriker, Jr., coll.) Three females, Nebraska City, May 19th, 1901.

Although the male differs so markedly from the female in having the cheeks armed and in the different shape of the head (the inner orbits parallel), yet they are so like in other respects that they appear to be the same species.

Types in the collection of M. A. Carriker, Jr., and University of Nebraska.

Exomalopsis Bruneri, n. sp.—♀. Black, shining; head sparsely punctured, vertex almost impunctate, clypeus with larger, sparse punctures and narrowly testaceous anteriorly; mandibles black, reddish medially; antennæ, the scape slightly reddish, flagellum ferruginous more or less dusky above; pubescence of face whitish, on the vertex brownish; sides of face with dense white decumbent pubescence, elsewhere the

pubescence of head sparse; mesothorax rather coarsely and sparsely punctured, rather densely clothed with brownish pubescence, longer and whitish on the pleura; on the disc posteriorly sparse; the scutellum bare, fringed posteriorly with brown hair; postscutellum similarly fringed posteriorly; the base of the metathorax with sparse punctures, the truncation smooth and polished; tegulæ brownish; nervures and stigma honey-colour; legs black, apical joints of tarsi ferruginous; legs clothed with brownish pubescence, that on the inner side of two anterior pairs of tarsi reddish; scopa of hind legs: on tibia whitish, tinged with yellow, on tarsus dusky reddish within; abdomen with the first two segments shining, smooth, apparently punctured only at the insertion of the hairs, which are sparse; the first segment truncate basally and the edge marked by a transverse carina; apical margins of segments with bands of brownish plumose pubescence, that on the first segment reduced to two lateral spots, slightly oblique; rest of segments in front of bands with dark pubescence; pubescence at the apex of abdomen more golden; ventral segments dark, apically ferruginous. Length, 7–8 mm.

♂.—Similar to the female, but with dense hair on the face and with the clypeus and labrum yellowish-white; pubescence lighter in colour; tarsi ferruginous. Length, 7–8 mm.

In old specimens the pubescence fades out and in the male becomes a silvery-white. Many specimens taken at Lincoln, Nebr., on *Helianthus annuus*.

Stelis pulchra, n. sp.—♀. Head greenish, bluish on the vertex, coarsely and confluently punctured on the face, on the vertex less closely and not confluently; thorax blue with greenish and purplish reflections, strongly but not closely punctured; abdomen greenish; pubescence on face light mixed with blackish and brownish hairs; on dorsum of thorax light; on pleura dark brown; on abdomen black; scape of antennæ greenish, punctured; flagellum dark testaceous, last three joints flattened on one side; tegulæ bluish with a light centre, punctured; legs same colour as the thorax, tarsi with dark brown hair; wings slightly dusky; abdomen with yellowish-white colour bands on segments 1–4; that on segment one bent backwards laterally; that on segment three attenuated laterally; that on segment four not reaching the sides of the abdomen and attenuated laterally; all narrowed medially; beneath bluish. Length, about 11 mm.

One specimen, Warbonnet Canyon, Sioux Co., Nebr., June 28th, 1901.

Epinomia triangulifera, Vachal.—Specimens of *E. persimilis*, Ckll., were sent to Mr. Vachal, and he writes that they are identical with his species. This name, having priority, must take the place of the one given by Prof. Cockerell.

Calliopsis verbenæ, var. *Nebraskensis*, n. var.—♀. Differs in having base of mandibles whitish and the apical margins of abdominal segments very pronouncedly testaceous; tegulæ entirely black and very polished.

♂.—Basal joints of tarsi blackish, apical ones testaceous; abdominal segments as in ♀.

This form was found at Lincoln, Nebr., July 4–7, and none of the typical form were taken.

NEW NORTH AMERICAN DIPTERA.

BY CHAS. W. JOHNSON, PHILADELPHIA, PA.

Macrocera immaculata, n. sp.—♂ ♀. Head yellow, vertex brownish; antennæ dark brown, the two basal joints yellow. Thorax dark yellow, with the anterior margin and humeri light yellow. Abdomen dark brown, shining, with a wide yellowish posterior margin on each segment. Legs yellow, slightly brownish at the tips of the femora, tibiæ and tarsi; legs and abdomen in the male with fine black hairs, which are less conspicuous in the female. Wings yellowish hyaline, with a slight brownish stigma and very fine hairs. Length of body 5 mm., the antennæ and posterior legs each about double the length of the body.

Two specimens collected at Richetts, North Mt., Pa., June 8, and one from the "Devil's Hole," Niagara Falls, N. Y., June 24. It resembles *M. hirsuta*, Loew, but is readily distinguished by its yellowish thorax and immaculate wings.

Phthiria Coquilletti, n. sp.—(*Phthiria*, n. sp. Smith's Coll. Insects of N. J., p. 649, 1899.) ♂. Face, front and occiput black, with a grayish pubescence; eyes purplish; proboscis and antennæ black, base of the

third and tip of the second joint narrowly banded with yellow. Thorax velvety black, with sparse, yellowish hairs; pleura grayish, scutellum black, the margin bearing a row of yellow hairs. Abdomen black, all excepting the first segment with a wide posterior marginal band of yellow, venter entirely yellow. Femora and coxæ black, tips of the femora and the tibiæ and tarsi yellowish, the outer portions of the tibiæ and tarsi more or less brownish, but usually absent on the middle tibiæ; basal half of the knobs of the halteres blackish, the remainder white. Wings hyaline. Length of body 3 mm., proboscis 1 mm.

♀.—Head light yellow or whitish; proboscis, the ocellary tubercle and third joint of the antennæ black, base of the third joint very narrowly marked with yellow, and the first and second joints yellowish or brownish. Thorax dull yellowish gray, the scutellum and pleura somewhat lighter, with a few whitish hairs. Abdomen a light yellowish colour, with sparse white hairs, the basal half of the second, third, fourth and fifth segments a dark brown or black; in drying, the abdomen often contracts so that only the brown of the second segment is visible. Legs yellow, the base of the front femora and the outer half of all the tarsi dark brown or black. Halteres white, the basal portion of the knobs tinged with brown.

Jamesbury and Riverton, N. J., July 3–6.

I first captured a male of this species at Jamesbury, July 4, 1891. It was submitted to Mr. Coquillett, who pronounced it new, but as the antennæ were wanting in the specimen he preferred not to describe it. Last summer, on July 3 and 4, I captured three females at Riverton. As they differed so much from the male, I was still unable to straighten out the matter, so postponed further study until another season. On July 4, at Riverton, while sweeping along a wood-road leading through a pine grove, I caught a male like the Jamesbury specimen, and on the 6th succeeded in capturing at the same place two males and seven females.

To my esteemed friend, Mr. D. W. Coquillett, I now take pleasure in dedicating this interesting species.

Psilocephala grandis, n. sp.—♀. Head black; face and lower part of the front with a white pubescence, on the front confined to the sides

and separated by two diverging lines of black, extending from the base of the antennæ, with an angular patch of brownish pubescence above; the remainder of the front somewhat opaque, with black hairs; occiput below with white pubescence and pile, above with grayish pubescence and black hairs; antennæ black (third joint wanting). Thorax black, with two lateral and two dorsal grayish stripes, the latter dividing the black into three equal areas; pleura covered with a white pubescence; scutellum black, with a whitish border, bearing four black bristles. Abdomen black, shining, the posterior angles of the first, second, third and fifth segments with large pollinose spots, having white hairs on all, excepting those on the fifth segment, which has the short black hairs common to the greater portion of the abdomen; on the first segment the white hairs are particularly prominent and extend over the entire lateral portion; venter opaque, black, with a white posterior band on the second, third and fourth segments, first, second and third segments whitish pollinose. Legs black, slightly yellowish at the knees and base of the tarsi, the coxæ with whitish pubescence; knobs of the halteres yellow. Wings hyaline, veins and stigma dark brown, bordered by a slight brownish tinge, base of the wing yellowish, tegulæ white. Length, 16½ mm.

One specimen from Rouville Co., Province of Quebec, Canada; collected by Mr. G. Chagnon. The species is at once recognized by its large size. The specimen before me shows an interesting individual variation; on the right wing the fourth posterior cell is widely open, while on the left wing it is closed.

Agromyza flaviventris, n. sp.—Head light yellow, occiput black; antennæ yellow, aristæ black. Thorax light yellow, with a large black dorsal spot, which extends narrowly from the cervex, expanding dorsally, with lobes above the humeri and base of the wings; scutellum yellow, metathorax black. Abdomen dull light yellow, terminal segment black; halteres and legs yellow. Wings grayish hyaline. Length of the larger specimen, 2 mm.; the smaller one, 1½ mm.

Niagara Falls, N. Y., June 23, 1901.

SYNOPSIS OF HALICTINÆ.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

In connection with the study of the pollination of flowers by insects, for several years and in several journals I have published notes on the local Halictinæ, with descriptions of new species and the missing sexes of some which were only known in one sex. This paper is intended to bring my results together in a brief form.

The so-called genus *Halictus* of authors seems to be altogether too heterogenous. I restore *Lasioglossum* and propose two other new genera. I think that the several genera must stand or fall together. The venation shows that *Agapostemon* and *Augochlora* are more closely related to *Halictus*, as here limited, than are *Lasioglossum*, *Evylaeus* and *Chloralictus*.

As regards the dull greenish or bluish species, the venation shows that *H. fasciatus* belongs to *Halictus*, as here limited, a conclusion which is supported by the form of the pubescent fasciæ. The rest fall into *Chloralictus*, *Paralictus* and *Dialictus*.

Hemalictus, Ckll., holds the same relation to *Evylaeus* that *Dialictus* holds to *Chloralictus*. It is significant that these two genera are developed from forms in which the vein III_5 is normally enfeebled.

Remarkably different from Andreninæ, this nervure is very constant in Halictinæ. I have found it wanting in one specimen of *Chloralictus versatus* and in one of *Evylaeus cylindricus* received from Pérez, of Bordeaux. I have one specimen of *Oxystoglossa confusa* with the vein *rm* wanting in one wing, and another with veins *rm* and III_5 both wanting in one wing.

Oxystoglossa, Sm., has a definite type which, I judge from the description, belongs to the group having the hind spur finely serrate. The name is therefore used to designate that group.

In this paper vein *rm* = the radio-medial cross-vein = 1st cubital nervure; vein III_5 = 2nd cubital nervure; vein IV_3 = 1st recurrent nervure; vein *a* = the cross-vein element of the arculus = the basal nervure; cell III_{1+2} = the marginal cell; cell III_5 = 2nd submarginal cell; cell III_4 = 3rd submarginal cell; "segment" refers to the abdomen; "joint" refers to the antenna.

Females.

Front wing with veins beyond IV_3 obsolescent; cells III_4 and III_5 subequal ..... 5.

Front wing with veins beyond IV_3 not obsolescent; cell III_4 at least nearly twice as long as III_5 ..... 1.

1. Labrum flat, ciliate; cell III_5 much wider than long, usually less than ½ as long as III_4; cell III_{1+2} pointed on costa; vein IV_3 near end of cell III_5; metathorax usually strongly rugose; abdomen usually more or less red; hind spur finely pectinate; hind knee plate obsolete; rima on segment 5 obsolete. . *Sphecodes.*

Labrum at apex produced, laterally compressed, pectinate; rima present ..... 2.

2. Black or dull greenish; segments of abdomen with apical pubescent fasciæ; cell III_{1+2} subappendiculate; vein IV_3 beyond the middle or near end of cell III_5; hind knee plate lanceolate; vein *a* rather suddenly bent at lower third ..... *Halictus.*

Bright golden green, at least the head and thorax; segments of abdomen with pubescent fasciæ basal or wanting ..... 3.

3. Metathorax sharply truncate, the truncation circular, bordered by salient rim; hind spur with three broad spines; hind knee plate obsolete; cell III_{1+2} subappendiculate; vein IV_3 beyond middle of cell III_5 ..... *Agapostemon.*

Metathorax rounded posteriorly, at least above, the truncation, when evident, subquadrate ..... 4.

4. Hind spur with 4–6 long teeth; cell III_{1+2} subappendiculate; vein IV_3 interstitial with III_5, or entering cell III_4; vein *a* rather strongly bent about the middle; hind knee plate obsolete ..... *Augochlora.*

Hind spur finely serrate; cell III_{1+2} usually pointed on costa; vein IV_3 usually interstitial with III_5, rarely entering cell III_4; vein *a* regularly arcuate; hind knee plate present, lanceolate ..... *Oxystoglossa.*

5. Front wing with vein III_5 not obsolescent; cell III_{1+2} subappendiculate; vein IV_3 near end of cell III_5; hind spur finely serrate; insect unusually smooth and opaque; segments 2–4 with basal pubescent fasciæ ..... *Lasioglossum.*

Front wing with vein III_5 also obsolescent or absent; vein IV_3 near end of cell III_5 or interstitial with vein III_5 ..... 6.

6. Black ..... *Evylaeus.*

Dull greenish or bluish, at least the head and thorax; hind spur with 3–5 long teeth ..... 7.

7. Vein III_5 wanting ..... *Dialictus.*
Vein III_5 present ..... 8.
8. Apex of labrum produced, laterally compressed, pectinate; mandibles dentate; cheek narrow ..... *Chloralictus.*
Apex of labrum broadly rounded, flat, ciliate; mandibles simple; cheeks and face broad; scopa, and rima of segment 5, obsolete ..... *Paralictus.*

Males.

Segments with apical pubescent fasciæ; black or dull greenish ..... *Halictus.*
Segments without apical pubescent fasciæ ..... 1.
1. Head and thorax dull greenish or bluish ..... 6.
Head and thorax bright golden green ..... 4.
Head and thorax black ..... 2.
2. Clypeus black, rather densely whitish pubescent; cell III_5 usually about ½ as long as III_4; abdomen often more or less red ..... *Sphecodes.*
Clypeus anteriorly with a yellowish mark, or black and thinly pubescent ..... 3.
3. Joint 4 a little shorter than 2 + 3; cheek broad; metathorax rather smooth; segments 2–4 with basal pubescent fasciæ. *Lasioglossum.*
Joint 4 longer than 2 + 3, or only a little longer than 3; those with basal pubescent fasciæ always have the metathorax strongly rugose ..... *Evylaeus.*
4. Abdomen black, with yellow bands ..... *Agapostemon.*
Abdomen like the head and thorax ..... 5.
5. Ventral segments 1–3 rigid, bright green, the others dark, retracted; tibiæ green; tarsi pale ..... *Augochlora.*
Ventral segments dark, except sometimes the middle ones, not rigid or retracted; tibiæ pale at least at base and apex ... *Oxystoglossa.*
6. Joint 4 hardly longer than 3; vein III_5 absent ..... *Dialictus.*
Joint 4 = 2 + 3, or nearly; vein III_5 present ..... 7.
7. Clypeus convex ..... *Chloralictus.*
Clypeus flat ..... *Paralictus*

Halictus, Latr.

Females.

Dull greenish; hind spur with 4 or 5 teeth ..... *fasciatus.*
Black, sometimes inclining to ferruginous ..... 1.

1. Wings and legs ferruginous; hind spur finely serrate, with 12 or more teeth ..... *parallelus.*
Wings and legs not ferruginous; hind spur with about 6–8 teeth .. 2.
2. Cheek beneath produced into a strong tooth or dentiform angle ..... *ligatus.*
Cheek rounded ..... *Lerouxii.*

Males.

Dull greenish; legs yellow ..... *fasciatus.*
Black ..... 1.
1. Femora and wings yellow or ferruginous ..... *parallelus.*
Femora black ..... 2.
2. Flagellum black; mandibles usually black ..... *Lerouxii.*
Flagellum beneath and middle of mandibles yellow ..... *ligatus.*

AGAPOSTEMON, Guérin.

Females.

Abdomen black ..... *viridulus.*
Abdomen green ..... 1.
1. Mesonotum with a distinct double punctuation ..... *Texanus.*
Mesonotum without a distinct double punctuation ..... 2.
2. Metathorax strongly longitudinally rugose, without enclosure ..... *radiatus.*
Metathorax coarsely reticulated, a triangular space finely rugose ..... *splendens.*

Males.

Abdomen with six yellow bands ..... 2.
Abdomen with five yellow bands ..... 1.
1. Ventral segment 4 thin, entire, 6 with a median carina .... *viridulus.*
Ventral segment 4 thickened, emarginate, margin depressed between the gibbous sides ..... *Texanus.*
2. Hind femora robust, their metatarsi carinate; basal middle of abdomen ferruginous ..... *splendens.*
Hind femora less robust, their metatarsi simple; basal middle of abdomen black, with a greenish tinge ..... *radiatus.*

AUGOCHLORA, Sm

Segment 2 rather opaque, closely punctured, densely ciliate *.fervida.*
Segment 2 shining, sparsely punctured, hardly ciliate ..... *viridula.*

OXYSTOGLOSSA, Sm.

Females.

Sides of mesonotum not reticulated; cell III_{1+2} subappendiculate ..... *pura.*

Sides of mesonotum reticulated; cell III_{1+2} pointed on costa ..... 1.

1. Larger, greener; antennæ, tegulæ and legs darker ..... *confusa.*
Smaller, more brassy; antennæ, tegulæ and legs paler ..... *similis.*

Males.

Ventral segment 4 not emarginate, greenish ..... *pura.*
Ventral segment 4 emarginate, not greenish ..... 1.

1. Larger, greener; antennæ, tegulæ and legs darker ..... *confusa.*
Smaller, more brassy; antennæ, tegulæ and legs paler ..... *similis.*

LASIOGLOSSUM, Curtis (Type *Melitta xanthopus*, Kby.).

Females.

Metathorax sharply truncate, the posterior face with sharp edge ..... *fuscipenne.*
Metathorax rounded posteriorly, no distinct posterior face ..... 1.

1. Clypeus less produced; mesonotum more shining; metathorax more rugose, more shining, the edge more salient ..... *Forbesii.*
Clypeus produced; mesonotum and metathorax smooth and opaque ..... *coriaceum.*

Males.

Face subquadrate; apex of one mandible reaching base of the other; tarsi dark ..... *coriaceum.*
Face narrowed below; apex of one mandible reaching the middle of the other; tarsi whitish ..... *Forbesii.*

EVYLAEUS, gn. nov. (Type *Halictus arcuatus*, Rob.).

Females.

Abdomen with pubescent fasciæ interrupted or wanting ..... 2.
Abdomen with pubescent fasciæ continuous; metathorax coarsely rugose ..... 1.

1. Metathorax sharply truncate; hind spur with long distinct teeth; segment 1 impunctate ..... *truncatus.*
Metathorax a little rounded behind; hind spur with teeth shorter, more oblique, less distinct; segment 1 finely punctured .. *arcuatus.*

2. Hind spur pectinate, with numerous fine, rather long, teeth ..... *pectinatus.*
Hind spur with 4 or 5 distinct teeth ..... 3.

3. Metathorax without an enclosed space ..... 5.
Metathorax with an enclosed space ..... 4.

4. Enclosure subtriangular; metathorax elsewhere densely pubescent ..... *nelumbonis.*
Enclosure semicircular; metathorax bare or nearly so .... *pectoralis.*

5. Segments 2–4 with white pubescent patches on each side ..... *quadrimaculatus.*
Segments 2–4 without white pubescent patches ..... *Foxii.*

Males.

Antennæ long, joint 4 longer than 2 + 3 ..... 3.
Antennæ short, joint 4 hardly longer than 3 ..... 1.
1. Clypeus anteriorly, mandibles, knees and tarsi, whitish ..... *quadrimaculatus.*
Clypeus anteriorly and the legs dark ..... 2.
2. Enclosure of metathorax semicircular ..... *pectoralis.*
Enclosure triangular ..... *nelumbonis.*
3. Metathorax finely rugose, apex gibbous, shining; small ..... *Foxii.*
Metathorax coarsely rugose; scutel subbilobed; flagellum festooned; tarsi whitish; larger ..... 4.
4. Segment 1 finely, distinctly, sparsely, punctured; apical margins of segments narrowly pale testaceous ..... *arcuatus.*
Segment 1 almost impunctate; insect more slender, blacker, knees more whitish ..... *truncatus.*

Chloralictus, gn. nov. (Type *Halictus Cressonii*, Rob.).

Females.

Tegulæ not punctate ..... 2.
Tegulæ punctate ..... 1.
1. Metathorax sharply truncate, with a sharp edge; wing whitish ..... *nymphæarum.*
Metathorax hardly truncate, the edge blunt ..... *tegularis.*
2. Abdomen not metallic ..... 6.
Abdomen greenish or bluish ..... 3.
3 Mesonotum shining, sparsely punctured; abdomen thinly pubescent; head hardly longer than broad; cheek broad and rounded ..... 5.
Mesonotum opaque, finely rugose, closely punctured; abdomen densely pubescent; head distinctly longer than broad; cheek narrow ..... 4.
4. Wing and pubescence yellowish; mesonotum brassy ..... *pilosus.*
Wing and pubescence whitish; mesonotum pale greenish ..... *pruinosus.*
5. Dark blue ..... *cæruleus.*
Brassy green ..... *zephyrus.*
6. Mesonotum rather finely punctured ..... 8.
Mesonotum rather coarsely punctured ..... 7.

7. Wing and nervures whitish ..... *albipennis.*
Wing and nervures ordinary ..... *Cressonii.*
8. Head distinctly longer than broad ; cheek narrow ; mesonotum quite opaque with fine roughness, sparsely punctured, often a little brassy ..... *cereopsis,* sp. nov.
Head hardly longer than broad ; cheek broad ..... 9.
9. Abdomen yellowish testaceous ..... *testaceus.*
Abdomen darker ..... 10.
10. Abdomen obovate ; segments 1–2 shining ; 3–5 darker, more opaque, with sparse closely-appressed hairs ; mesonotum shining, sparsely, finely, punctured ; metathorax nearly smooth .... *sparsus,* sp. nov.
Abdomen more oval, more densely pubescent, the hairs less appressed ..... 11.
11. Disc of metathorax bordered by a raised line, especially laterally ..... *Illinoensis.*
Disc of metathorax not bordered by a raised line ..... 12.
12. Abdomen brown, segments 3–5 closely pubescent .. *versatus,* sp. nov.
Abdomen more black, segments 3–5 less pubescent ..... 13.
13. Raised lines of disc of metathorax not reaching the apex, the latter rounded ..... *obscurus.*
Raised lines of metathorax reaching apex, which is truncate ..... *smilacinæ.*

Males.

Tegulæ not punctate ..... 2.
Tegulæ punctate ..... 1.
1. Metathorax with semicircular enclosure ; wing whitish. *nymphæarum.*
Metathorax without enclosure ; wing ordinary ..... *tegularis.*
2. Abdomen without greenish or bluish reflection ..... 7.
Abdomen greenish or bluish ..... 3.
3. Mesonotum smooth and shining, finely and sparsely punctured ; head hardly longer than wide ..... 6.
Mesonotum finely rugose, opaque, closely punctured ..... 4.
4. Head a little longer than wide ; clypeus without yellowish ; the greenish tinge of abdomen slight ..... *versatus,* sp. nov.
Head much longer than wide ; apex of clypeus usually yellowish ; abdomen distinctly greenish ..... 5.
5. Pubescence above and nervures and stigma yellowish ..... *pilosus.*

Pubescence above and nervures and stigma whitish ..... *pruinosus.*

6. Dark blue ..... *cæruleus.*

Greenish ; abdomen usually more or less testaceous ..... *zephyrus.*

7. Abdomen and tibiæ almost entirely testaceous ..... *zephyrus.*

Abdomen not testaceous ; tibiæ black except often at base and apex ..... 8.

8. Sides of metathorax and pleura distinctly punctured, the latter beneath with a distinct fovea ; mesonotum smooth, shining, coarsely punctured ..... *foveolatus*, sp. nov.

Sides of metathorax and pleura not distinctly punctured ..... 9.

9. Vein III_5 and beyond almost obsolete ; head much longer than wide ; mesonotum finely rugose, opaque, sparsely, finely punctured ; antennæ short ; tarsi pale ..... *coreopsis*, sp. nov.

Vein III_5 and beyond ordinary ; head not, or hardly, longer than wide ..... 10.

10. Mesonotum finely punctured ..... 12.

Mesonotum coarsely punctured, shining ..... 11.

11. Wing white, nervures and stigma white ..... *albipennis.*

Wing ordinary, nervures and stigma dark ; metathorax coarsely reticulated, with a semicircular enclosure bordered by a sharp edge ..... *Cressonii.*

12. Mesonotum shining ; head wider than thorax ; metathorax at apex gibbous, smooth, shining ; nervures and stigma dark ; abdomen subclavate, almost impunctate, usually darker towards apex ; length 4 mm ..... *sparsus*, sp. nov.

Mesonotum opaque ; abdomen hardly subclavate ..... 13.

13. Abdomen bronze black, minutely punctured, bare impunctate apical margins of segments broad ; nervures and stigma dark .. *obscurus.*

Abdomen less black, distinctly punctured, bare impunctate apical margins of segments narrow, often pale testaceous ; nervures and stigma pale : length, 4-6 mm ..... *versatus*, sp. nov.

PARALICTUS, Rob.

Females.

Cheek regularly rounded ; face narrowed below ..... *simplex.*

Cheek with rounded angle below middle of eye ; face narrowed below ..... *platyparius.*

Cheek with rounded angle a little above middle of eye ; face not narrowed below ..... *cephalicus.*

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A PRELIMINARY LIST OF ACRIDIIDÆ OF ONTARIO.

BY E. M. WALKER, B. A., TORONTO.

Since the last of my "Notes on Some Ontario Acridiidæ" were printed, five species have been added to the list, and the number of localities for those already recorded has been considerably increased. I think, therefore, that it will make the notes more complete to conclude them with a full list of the species of this family known to occur in the Province, with their distribution as hitherto recorded.

Only a small portion of the territory included in the Province of Ontario has been at all thoroughly explored by entomologists, but I do not believe there are very many native species of Acridiidæ not included in the present list. Doubtless, however, some of the Manitoba and Minnesota forms extend into the north-western part of Ontario, while it is extremely probable that there are unrecorded species in the south-west, and possibly a few in the east and extreme north.

The five species referred to above are as follows :

TRYXALIS BREVICORNIS, Linn.

Gryllus brevicornis, Linn. Syst. Nat., ed. 12, II., 692 (1767).

Tryxalis brevicornis, Fabr. Syst. Ent., 279 (1775).

Pyrgomorpha brevicornis, Walk. Cat. Derm. Salt. Brit. Mus., III., 500 (1870).

Opsomala punctipennis, Serv. Orth., 590 (1839).

Two males of this southern species were taken just above Point Pelee, in an open marsh bordering a creek, on Aug. 8, 1901. They were very active, and leaped several times among the sedge before they were caught.

This species has a very interesting distribution, being found from Long Id. and Indiana south to the Gulf of Mexico, and through Texas to Honduras and Brazil.

ORPHULELLA PELIDNA, Burm.

Gomphocerus pelidnus, Burm. Handb. Ent., II., 650 (1838).

Stenobothrus maculipennis, Scudd. Bost. Jour. Nat. Hist., VII., 458–459 (1862).

Stenobothrus propinquans, Scudd. Ibid., VII., 461 (1862).

Orphula pelidna, McNeill. Proc. Dav. Acad. Nat. Sc., VI., 235–239 (1897).

Orphulella pelidna, Scudd. Can. Ent., XXXI., 179–187 (1899).

I found this species in large numbers in a tract of open marsh land bordering the St. Clair River, just north of Sarnia. This piece of land was dry when I visited it, but in the early summer was covered with water. *O. pelidna* was found in the more bare places, where the ground was dry and somewhat cracked. The males produced a rapid, rattling sound when flying, like the various members of the Oedipodinæ, but the sound did not last more than about a second. Although the grass was long where they occurred, they always alighted on the ground.

Trimerotropis huroniana, Walk.

Trimerotropis huroniana, Walk. Can. Ent., XXXIV., 1 (1902).

This species has been fully described under the above reference, so that it need only be alluded to here.

Paroxya floridana, Thom.

Caloptenus floridanus, Thom. Bull. U. S. Geol. Surv. Terr., I., No. 2, 68 (1874).

Paroxya atlantica, Scudd. (pars). Proc. Bost. Soc. Nat. Hist., XIX., 29, 88 (1887).

Paroxya floridana, Smith. Cat. Ins., N. J., 412 (1890).

This insect was found in considerable numbers in a sedgy swamp bordering a small stream at Arner, Ont. It is a southern form.

Melanoplus Bruneri, Scudd.

Melanoplus Bruneri, Scudd. Rev. Mel. 164, 1897.

On Sept. 2, 1902, while collecting at Dwight, in Northern Muskoka, at the close of a fortnight's canoe trip in Algonquin Park, I captured a single specimen of a *Melanoplus*, which I at once recognized as new to Ontario. There was not time to make a thorough search for more specimens, and none were found. The specimen is a male and agrees in nearly all respects with *M. Bruneri* as described in Scudder's Revision. The chief point in the description which does not fit my specimen is the statement that the interspace between the mesosternal lobes is more than twice as long as broad in the male, whereas in my specimen it is slightly less than twice as long as broad. The male cerci appear more upcurved

than is represented in Scudder's figure, which it otherwise resembles pretty closely.

M. Bruneri is a western species, having been reported from Alberta, Washington, Idaho, Montana, Colorado and Nebraska.

In the list I have used the abbreviations Caulf. and Walk. in reference to the following two articles, respectively:

Caulfield, F. B.: A sketch of Canadian Orthoptera. Rep. Ent. Soc., Ont., XVIII., 59–72 (1888).

Walker, E. M.: Notes on some Ontario Acridiidæ, CAN. ENT., XXX., 122–126 (1898); Ibid., XXX., 258–263 (1898); Ibid., XXXI., 29–36 (1899).

The names of new localities are given in italics.

I.—TETTIGINÆ.

1. *Nomotettix cristatus*, Scudd. Toronto (Caulf.).
2. *Tettix granulatus*, Kirby. Ottawa, Ont., generally, to L. Superior (Caulf.); Toronto, L. Simcoe, Muskoka (Walk.); *Six-mile Lake*, Aug. 24, 1898; *Sarnia*, Aug. 12, 1901; *Southampton*, Aug. 20, 1901; *Johnson's Harbour, Bruce Co.*, Aug. 22, 1901; *Stokes Bay, Bruce Co.*, Aug. 27, 1901; *Tobermory*, Aug. 24, 1901; *Owen Sound*, Aug. 31, 1901; *North River* and *Island Lake, Algonquin Park*, Aug. 24, 28, 1902.
3. *Tettix acadicus*, Scudd. Lake of the Woods (Scudd., Daws., Rep. Geol., 49 par., 345, 1875).
4. *Tettix ornatus*, Say. Ont. generally (Caulf.); Toronto (Walk.); *Sarnia*, Aug. 16, 1901.

4a. *Tettix ornatus*, var. *triangularis*, Scudd. Ottawa, Ont., generally (Caulf.); Toronto (Walk.); *Southampton*, Aug. 29, 1901; *North River, Algonquin Park*, Aug. 20, 1902.

5. *Tettix Hancocki*, Morse. } Sudbury (Morse, Journ.
5a. *Tettix Hancocki*, var. *abbreviatus*, Morse. } N. Y. Ent. Soc., VII., 200–201, 1889); *Toronto*, May, Sept., Oct.; *Lake Simcoe*, Aug., Sept.; *Little Eagle Harbour*, Bruce County, Aug. 23, 1901; *Dwight, Muskoka*, Sept. 2, 1902.

6. *Tettix obscurus*, Hanc. De Grassi Pt. (Hancock, Tet. N. A., 89, 1902); *Toronto*, April; *Goderich*, Aug. 19, 1901; *Owen Sound*, Aug. 31, 1901.
7. *Tettix gibbosus*, Hanc. Toronto (Hanc., Tet. N. A., 90, 1902); *Lake Simcoe*, July 5, 1901. NOTE.—Species 5, 6 and 7 were included in T. ornatus in my "Notes on some Ontario Acridiidæ."

8. *Paratettix cucullatus*, Scudd. Ont. generally (Caulf.); Toronto (Caulf., Walk.); *Chatham*, Aug. 10, 1901. NOTE.—*P. rugosus*, Scudd., is reported by Caulfield from Sudbury, but probably incorrectly, as it is a southern species.

9. *Tettigidea parvipennis*, Harris. Ottawa, Ont., generally, to L. Superior (Caulf., *polymorpha)*; Ont. (Walk.); *Pt. Pelee*, Aug. 7, 1901 (nymphs); *Arner*, Aug. 8, 1901 (nymphs); *Owen Sound*, Aug. 31, 1901; *North River*, *Algonquin Park*, Aug., 1902 (nymphs); *North Bay*, Sept. 12, 1900.

9a. *Tettigidea parvipennis*, var. *pennata*, Morse. Ottawa, Ont., generally, to L. Superior (Caulf., *lateralis*); Toronto, L. Simcoe, (Walk.).

II.—TRYXALINÆ.

10. *Tryxalis brevicornis*, Linn. *Pt. Pelee*, Aug. 8, 1901.

11. *Orphulella pelidna*, Burm. *Sarnia*, Aug. 12, 13, 15, 1901.

12. *Orphulella speciosa*, Scudd. Toronto, Lake Simcoe (Walk.); *Rond Eau*, Sept. 15, 1899; *Arner*, Aug. 9, 1901; *Sarnia*, Aug. 12, 16, 1901. (The *Orphula aequalis* of my former paper.)

13. *Chlöealtis conspersa*, Harris. Rat Portage (Caulf.); Nepigon (Caulf., Walk.); Toronto, Lake Simcoe, Clear Lake, Kingsville, Severn River (Walk.); *Rond Eau*, Sept. 15, 1899; *Pt. Pelee*, Aug. 7, 1901; *Arner*, Aug. 9, 1901; *Sarnia*, Aug. 12, 1901; *Goderich*, Aug. 18, 1901; *North River*, *Algonquin Park*, Aug., 1902; *North Bay*, Sept. 12, 1900.

13a. *Chlöealtis conspersa*, var. *prima*, Morse. Lake Simcoe (Walk.).

14. *Chlöealtis abdominalis*, Brun. Severn River (Walk.)

15. *Stenobothrus curtipennis*, Harris. Ottawa, Ont., generally, to the north of L. Superior (Caulf.); Ont. (Walk.); *Toronto; Lake Simcoe; Clear Lake*, July 27, 1897; *Niagara*, Sept. 26, 1898; *Rond Eau*, Sept. 14, 1899; *Pt. Pelee*, Aug. 7, 1901; *Arner*, Aug. 9, 1901; *Chatham*, Aug. 10, 1901; *Sarnia*, Aug. 12, 16, 1901; *Walpole Id.*, *River St. Clair*, Aug. 13, 1901; *Goderich*, Aug. 18, 1901; *Southampton*, Aug. 20, 29; *Johnson's* and *Little Eagle Harbours*, *Bruce Co.*, Aug. 22, 23, 1901; *Tobermory*, Aug. 24, 1901; *Owen Sound*, Aug. 30, 31, 1901; *Severn River*, Aug. 17, 1878; *Lake Muskoka*, Aug. 27, 1899; *Algonquin Park*, Aug., 1902; *North Bay*, Sept. 12, 1900.

15a. *Stenobothrus curtipennis*, var. *longipennis*, Scudd. Same localities as preceding.

16. *Mecostethus lineatus*, Scudd. Toronto, Lake Simcoe, Aurora, (Walk.); *Point Pelee*, Aug. 8, 1901; *Sarnia*, Aug. 12, 16, 1901; *Stokes Bay*, *Bruce Co.*, Aug. 27, 1901.

17. *Mecostethus gracilis*, Scudd. Lake Simcoe, Aurora (Walk.). In my "Notes" I stated that this species had precisely similar haunts to those of the preceding. Further collecting has shown that although often found together, *gracilis* prefers comparatively small open places in swampy woods, whereas *lineatus* occurs in large, open, sedgy marshes.

III.—Oedipodinæ.

18. *Arphia tenebrosa*, Scudd. Nepigon, Sudbury (Caulf.).

19. *Arphia sulphurea*, Fab. Ont., generally (Caulf.); Toronto (Caulf., Walk.); *Sarnia*, Aug. 16, 1901 (larva).

20. *Chortophaga viridifasciata*, De Geer. Ottawa, Ont., generally, to north of L. Superior (Caulf.); Hamilton, Grimsby, Toronto, Lake Simcoe, Clear Lake (Walk.); *Rond Eau*, Sept. 15, 1899 (nymphs); *Arner*, Aug. 9, 1901 (nymph); *Walpole Id.*, Aug. 13, 1901 (nymphs); Goderich, Aug. 19, 1901 (nymph).

20a. *Chortophaga viridifasciata*, form *infuscata*. Harris. Same localities as preceding.

21. *Encoptolophus sordidus*, Burm. Toronto, Hamilton, Niagara, Lake Simcoe (Walk.); *Rond Eau*, Sept. 14, 1899; *Arner*, Aug. 9, 1901 (nymphs); *Sarnia*, Aug. 16, 1901; *Goderich*, Aug. 19, 1901 (nymphs); *Southampton*, Aug. 20, 1901 (nymph).

22. *Camnula pellucida*, Scudd. Nepigon, Clear Lake, Lake Simcoe, Toronto (Walk.); *Rond Eau*, Sept. 14, 1899; *Point Pelee*, Aug. 7, 1901; *Sarnia*, Aug. 12, 1901; *Walpole Id.*, Aug. 13, 1901; *Goderich*, Aug. 19, 1901; *Southampton*, Aug. 20, 1901; *Johnson's* and *Little Eagle Harbours*, *Bruce Co.*, Aug. 22 and 23, 1901; *Tobermory*, Aug. 24, 1901; *Stokes Bay*, Aug. 27, 1901; *Owen Sound*, Aug. 30, 1901; *Severn River*, Aug. 15, 17, 1898; *Lake Muskoka*, Aug. 27, 1899; *North River*, *Algonquin Park*, Aug., 1902; *North Bay*, Sept. 12, 1900.

23. *Hippiscus tuberculatus*, Pal. de Beauv. Nepigon (Caulf., Scudd., Psyche, VI., 304, 1892); Ottawa (Harrington, Ann. Rep. Ent. Soc., Ont, 1883, 17); Toronto, London (Walk.); *Sault Ste. Marie*, June 7, 10, 1889.

24. *Dissosteira carolina*, Linn. Ont., generally, to Lake Superior (Caulf.); Rat Portage, Muskoka, Lake Simcoe, Toronto, Hamilton (Walk.);

Rond Eau, Sept. 14, 1899; *Pt. Pelee*, Aug. 7, 1901; *Arner*, Aug. 9, 1901; *Chatham*, Aug. 10, 1901; *Sarnia*, Aug. 12, 1901; *Walpole Id.*, Aug. 13, 1901; *Southampton*, Aug. 20, 1901; *Goderich*, Aug. 19, 1901; *Tobermory*, Aug. 24, 1901; *Owen Sound*, Aug. 30, 1901; *Severn River*, Aug., 1898; *North River*, *Algonquin Park*, Aug., 1902; *North Bay*, Sept. 12, 1900.

25. *Spharagemon collare*, Scudd., race *Wyomingianum*, Morse; Rond Eau (Walk.); *Pt. Pelee*, Aug. 7, 1901. (The specimens from Pt. Pelee average distinctly larger than those from Rond Eau.)

26. *Spharagemon bolli*, Scudd. Toronto (Morse, Psyche, VI., 291, Walk.); Stony Lake, Peterboro Co. (Walk.); *Rond Eau*, Sept. 15, 1899; *Pt. Pelee*, Aug. 7, 1901; *Arner*, Aug. 9, 1901; *Sarnia*, Aug. 16, 1901. (The specimens from Rond Eau, Pt. Pelee and Arner are much larger than those from the other more northern localities.)

27. *Scirtetica marmorata*, Harris. Sparrow Lake, Gravenhurst, Severn River (Walk.); *Lake Muskoka*, Aug. 27, 1899.

28. *Trimerotropis maritima*, Harris. Toronto Id., Kingsville (Walk.); *Rond Eau*, Sept. 14, 1899; *Pt. Pelee*, Aug. 7, 1901; *Walpole Id.*, Aug. 13, 1901; *Sarnia*, Aug. 12, 14, 1901.

29. *Trimerotropis huroniana*, Walk. Southampton (Walk., Can. Ent., XXXIV., 1).

30. *Circotettix verruculatus*, Kirby. Ottawa (Caulf.); Rat Portage, Molson, Jackfish, Stony Lake, Lake Simcoe, Aurora, Gravenhurst (Walk.); *Southampton*, Aug. 21, 29, 1901; *Johnson's* and *Little Eagle Harbours*, *Bruce Co.*, Aug. 22, 23, 1901; *Tobermory*, Aug. 24, 1901; *Stokes Bay* and *Burke Id.*, *Lake Huron*, Aug. 27, 1901; *Owen Sound*, Aug. 31, 1901; *Severn River*, Aug. 14, 1898; *Lake Muskoka*, Aug. 27, 1899; *North River*, *Algonquin Park*, Aug., 1902; *North Bay*, Sept. 12, 1900.

Acridiinæ.

31. *Schistocerca Americana*, Drury. London (Moffat); Toronto (Walk.).

32. *Podisma glacialis*, Scudd. Sudbury (Scudd., Rep. Ent. Soc., Ont., XXVI., 63); North Bay (Walk.).

33. *Podisma variegata*, Scudd. Lake Simcoe, Muskoka (Walk.); *Tobermory*, Aug. 24, 25, 1901; *North River*, *Algonquin Park*, Aug. 21, 27, 1902.

34. *Melanoplus Bruneri*, Scudd. *Dwight*, *Muskoka*, Sept. 2, 1902.

35. *Melanoplus atlanis*, Riley. Ottawa (Caulf., Fletch., Rep. Exp. Farms, Can., 1888, 63); Sudbury (Scudd.); Rat Portage, Nepigon, Severn R., L. Simcoe, Toronto (Walk.); *Rond Eau*, Aug. 14, 1899; *Pt. Pelee*, Aug. 7, 1901; *Sarnia*, Aug. 12, 1901; *Goderich*, Aug. 19, 1901; *Southampton*, Aug. 20, 1901; *Tobermory*, Aug. 24, 1901; *Johnson's* and *Little Eagle Harbours*, Aug. 22, 23, 1901; *Owen Sound*, Aug. 30, 1901; *Lake Muskoka*, Aug. 27, 1899; *North River*, *Algonquin Park*, Aug., 1902; *North Bay*, Aug. 12, 1900.

36. *Melanoplus Dawsoni*, Scudd. Toronto, Severn R. (Walk.).

37. *Melanoplus islandicus*, Blatchl. Toronto, Aurora, Lake Simcoe, Severn R., near Lake Kabinakagami (Algoma) (Walk.); *Southampton*, Aug. 20, 21, 1901; *Johnson's* and *Little Eagle Harbours*, Aug. 22, 23, 1901; *Tobermory*, Aug. 24, 1901; *North River* and *Island Lake*, *Algonquin Park*, Aug. 19–28, 1902; *North Bay*, Sept. 12, 1900.

38. *Melanoplus fasciatus*, Walk. Lake of the Woods (Scudd., Daws., Rep. Geol., 49 par., 343); Toronto, Lake Simcoe, Stony Lake (Walk.); *Point Pelee*, Aug. 7, 1901; *Johnson's* and *Little Eagle Harbours*, Aug. 22, 23, 1901; *Tobermory*, Aug. 24, 1901; *North River*, *Algonquin Park*, Aug. 23–31, 1902.

38a. *Melanoplus fasciatus*, var. *volaticus*, Scudd. Lake Simcoe (Walk.); *Johnson's Harbour*, Aug 22, 1901, 3 ♂ ♂.

39. *Melanoplus femur-rubrum*, DeGeer. Ottawa, Ont., generally, to north of L. Superior (Caulf.); Ont. (Walk.); *Rond Eau*, Sept. 14, 1901; *Pt. Pelee*, Aug. 7, 1901; *Arner*, Aug. 9, 1901; *Chatham*, Aug. 10, 1901; *Sarnia*, Aug. 12, 1901; *Walpole Id.*, Aug. 13, 1901; *Goderich*, Aug. 19, 1901; *Southampton*, Aug. 20, 1901; *Johnson's* and *Little Eagle Harbours*, Aug. 22, 23, 1901; *Tobermory*, Aug. 24, 1901; *Stokes Bay* and *Burke Id.*, *L. Huron*, Aug. 27, 1901; *Owen Sound*, Aug. 30, 1901; *Lake Muskoka*, Aug. 27, 1899; *North River*, *Algonquin Park*, Aug. 25–31, 1902; *North Bay*, Sept. 12, 1900.

40. *Melanoplus extremus*, Walk. Algoma, near portage between Lake Kabinakagami and the Matawishguia River (Walk.)

41. *Melanoplus coccineipes*, Scudd. Sudbury (Scudd., Rep. Ent. Soc., Ont., XXVI., 64).

42. *Melanoplus minor*, Scudd. Toronto (Walk.)

43. *Melanoplus collinus*, Scudd. Toronto, Lake Simcoe, Severn R., Hawk Lake (Walk.); *Rond Eau*, Sept. 14, 1901; *Pt. Pelee*, Aug. 7, 1901; *Arner*, Aug. 9, 1901; *Sarnia*, Aug. 12, 1901; *Lake Muskoka*, Aug. 27, 1899; *Dwight, Muskoka*, Sept. 2, 1902; *North River* and *Big Joe Lake, Algonquin Park*, Aug. 25–31, 1902; *North Bay*, Sept. 12, 1900.

44. *Melanoplus bivittatus*, Say. Lake of the Woods (Scudd., Daws., Rep. Geol., 49 par., 343); North Bay (Walk.).

45. *Melanoplus femoratus*, Burm. Ont., everywhere (Caulf.); Ont., North Bay (Walk.); Niagara, *Rond Eau*, Sept. 14, 1899; *Pt. Pelee*, Aug. 7, 1901; *Arner*, Aug. 9, 1901; *Chatham*, Aug. 10, 1901; *Sarnia*, Aug. 12, 1901; *Walpole Id.*, Aug. 13, 1901; *Goderich*, Aug. 19, 1901; *Southampton*, Aug. 20, 1901; *Johnson's* and *Little Eagle Harbours*, Aug. 22, 23, 1901; *Tobermory*, Aug. 24, 1901; *Stokes Bay* and *Burke Id., L. Huron*, Aug. 27, 1901; *Owen Sound*, Aug. 31, 1901; *Lake Muskoka*, Aug. 27, 1899; *Algonquin Park*, Aug. 1902.

46. *Melanoplus punctulatus*, Uhl. Toronto, L. Simcoe (Walk.).

47. *Paroxya floridana*, Thom. *Arner*, Aug. 9, 1901.

THE NORTHWEST (CANADA) ENTOMOLOGICAL SOCIETY.

YOUNG FOLKS' PRIZE COMPETITION.

1. For best collection of injurious and beneficial insects, Dr. James Fletcher will give a prize of $2.50, or a standard book on insects.

2. For best general collection of insects, $1.50.

3. For best collection of pressed plants, in which noxious weeds and grasses and their characteristics must be a feature, Dr. Fletcher will give a prize of $2.50, or a book.

4. For best general collection of plants, $1.50.

Of these prizes, two will be given by Dr. Fletcher, and two by the N.-W. Entomological Society. The awarding will take place in Calgary immediately prior to the annual meeting of that Society. Further prizes may be given should the exhibits deserve them.

NEW GENERA AND SPECIES OF N. A. FULGORIDÆ.

BY E. D. BALL, STATE AGRICULTURAL COLLEGE, FORT COLLINS, COLO.

Anotia Kirkaldayi, n. sp.—Form and general appearance of *Amalopota Fitchi*, but broader and less definitely marked. Form of *A. Burnetii*, but with a sharp head and blunter elytra. Length, including elytra, 6.5 mm.

Vertex slightly broader than in *Burnetii*, inclined upward, nearly flat, not rounding over at apex as in that species; elytra broader towards apices than in *Burnetii*; venation very similar, but with the median nervure not forked beyond the cross-vein, and the first branch of the post-costal nervure coming off close to the cross-vein and at nearly right angles to the nervure. Costal appendix larger than in *Burnetii*, obliquely truncate posteriorly.

Colour: pale creamy, slightly tinged with testaceous, a pale testaceous stripe runs from the eye forward to the apex of vertex, and another from below the eye downward to the front; elytra milky subhyaline, a faint smoky or testaceous spot near base, a smoky transverse band half way to apex of clypeus, another partial band extending to the sutural margin, down the median to the cross nervure, and then out that to the post-costal; beyond this nearly all the nervures are broadly smoky margined, leaving a light patch in each anteapical cell and a light spot on apex of each apical nervure; the costal margin beyond the middle, the costal nervures, the apical margin, the apical nervures, except their apices and a section of the postcostal beyond the cross nervure, testaceous.

Described from a single specimen collected by the author, at Ames, Iowa.

The custom of commemorating the distinguished workers in Hemiptera in the naming of the Derbidæ seems to me to be a good one, and I am pleased to add to this list the name of our colleague, whose careful nomenclatural work will place our Hemipteralogical classification at once upon a sound basis of fact such as it would not have otherwise enjoyed for years to come.

Anotia Sayi, n. sp.—Resembling *Burnetii* in form, but much larger, as large as *Otiocerus*. Costal appendage very long; colour yellowish; elytra white, with a transverse fuscous band before the middle. Length, 11 mm. to the tip of elytra.

Vertex but little rounded above, the apex slightly rounder than in *Kirkaldayi*. Second joint of antennæ very large, consisting of a long, flat plate thickest on the margins and studded with fine knobs; elytra very large, venation as in *Burnetii* nearly, the outer branch of the median nervure straight, the cross nervures at the apices of the elytra in a straight line; costal appendage as long as the second joint of antennæ, strap-shaped towards apex, the posterior margin nearly straight, anterior margin sloping off to the base of the costa; the whole appendix curved back across the corium, with the apex on the claval suture.

Colour: pale straw; eyes black; elytra milky at base, a fuscous band at one-third the distance from base, beyond this subhyaline, with the nervures faintly brown as far as the apical nervures. Posterior margin of appendage, and sometimes a spot near the outer corner of scutellum, fuscous.

Described from two females collected at Albion, N. Y., by E. P. Van Duzee.

Patara Vanduzei, n. sp.—Form and general appearance of *guttata*, but with a smaller front and different venation; brownish purple, with a light line on vertex and pronotum, and light dots around the apex of elytra. Length, 4.75 mm.

Vertex and front together semicircular, about equally margining the eye all around as seen from side, front rising abruptly from clypeus, compressed, the margin slightly thickened; vertex expanded posteriorly; pronotum slightly carinate, broad and nearly parallel margined; venation closely resembling *guttata*, but with four cells between the postcostal and the median before the apical cell. There is a reflexed veinlet from the median into the anal area, and two reflexed veinlets from the outer branch of the mediastinal to the costal. This branch is interrupted just before the apex, making it appear as if the reflexed vein was the end of the nervure.

Colour: vertex white, front and antennæ brownish testaceous; pronotum brownish fuscous, with a broad, median, light stripe; scutellum bright testaceous, sometimes with a pale stripe; elytra brownish purple, the tuberculate nervure of clavus white, a light spot on the apex of each apical nervure and a broad one on the inner reflexed one. Nervures bright testaceous, the three cross nervures before the apical cells fuscous.

Described from three females in the collection of E. P. Van Duzee, from Gowanda, N. Y. The adding of this name to the list is peculiarly

appropriate, in that it adds that of one of our strongest Hemipterists, and at the same time the name of one who has contributed much to our knowledge of the American Derbidæ.

Cenchrea Heidemanni, n. sp.—Resembling *dorsalis* in form, but larger and lighter coloured: pale orange yellow, with the elytra white. Length, 7.25 mm.

Vertex broad, slightly angled with the broad, parallel margined front, margins with distinct, slightly serrate carina; pronotum with the lateral margins broad, wing-like, posterior margin deeply, angularly emarginate; scutellum weakly tricarinate; elytra long; venation simple, all three veins with long narrow forks, the apices of the mediastinal not as strongly angled as in *dorsalis*, the claval nervure and the basal half of the mediastinal tuberculate, the posterior half of costal and the whole apical margin finely serrate.

Colour: pale orange yellow; elytra milky white, below pale.

Described from one female from Effingham, Kansas, collected by E. P. Van Duzee, and another from Washington, D. C., from Otto Heidemann. This is only one of the many fine specimens that Mr. Heidemann has turned over to me for study.

Neither this nor the preceding genus has before been recognized in our fauna. They were both founded on species from St. Vincent Island.

Cenchrea Uhleri, n. sp.—Size and form of *Lamenia Californica* nearly, slightly longer and narrower, much smaller than *Heidemanni;* pale creamy or slightly testaceous yellow, the elytra margined with fuscous. Length, 5 mm.

Vertex distinctly longer than in *Californica*, shorter and broader than in *Heidemanni*, definitely angled with front; front widening slightly below to the large clypeus; elytra long, strictly parallel margined; male plates long, strap-like, slightly widening towards apex.

Colour: pale creamy yellow, slightly washed with tawny, the abdominal segments both above and below black, with light margins; elytra creamy, a round fuscous spot just before the apex of costa, and usually a brownish or fuscous submarginal stripe along the costa, a brownish line along the sutural margin; the tip of the wing often tawny.

Described from six specimens from D. C. and Md. (Heidemann), two from Effingham, Kansas (Van Duzee), and three from Onaga, Kansas (Crevecoeur).

Lamenia obscura, n. sp.—Form and general appearance of *vulgaris* nearly, usually slightly smaller and paler. Readily separated on the male genitalia. Length, 4 mm.

Vertex short, sloping, half wider than long, separated from front by a slight carina; front rather broad, nearly flat, a faint median carina; clypeus convex in both diameters, rather prominent; median carina much elevated, acute; elytra about as in *vulgaris*, not as strongly sinuate on costa.

Colour: slaty black, pruinose, giving this species a powdered gray appearance. Head black, the carinate margin of vertex in front pale, lateral carinæ of pronotum pale. Elytra slaty at base, smoky, subhyaline at apex, a spot on costa, where the mediastinal nerve touches it, and the two transverse nervures at the bases of the apical cells light. Legs pale; rostrum pale, apical segment black.

Genitalia: last ventral segment in male transverse, not enlarged, posterior margins straight; plates widely separated at base by an equilaterally triangular notch, their inner margins confluent from the apex of notch to the upturned tips, together transversely convex, forming a long, nearly parallel margined trough with a rounding apex. Their apices are furnished with long slender teeth set at right angles to the plate. In the normal position these teeth cross each other and close the end of the trough.

Described from twenty-two specimens taken at Greeley, Colo., by the author, and two specimens from How Creek and Lake Worth, Fla., in the collection of Mr. Heidemann.

Lamenia inflatà, n. sp.—Form of *vulgaris* nearly, slightly longer and narrower, dark smoky brown, paler on pronotum and face. Length, 4 5 mm.

Vertex rather narrow, rounding to the retreating front; front full, without a median carina; elytra long and narrow, distinctly notched at the junction of the mediastinal and costa; venation as in *Californica*.

Colour: vertex, front and pronotum pale testaceous brown; clypeus smoky brown; elytra dark smoky brown, the costal incision and the transverse nervures before the apex faintly marked with light; legs and rostrum pale.

Genitalia: last ventral segment in the male longer than wide, convex, thickened, the posterior margin sinuate; plates distant from each

other at base, long, flat, narrow at base, gradually widening to the bluntly rounding apices, the apical spines just touching each other.

Described from eight specimens in the author's collection taken in Hayti by R. J. Crew.

Peltonotellus rugosus, n. sp. — Form and general appearance of *histrionicus* nearly, the vertex shorter and the venation reticulate. Length: ♀, 3.5 mm.; ♂, 2.5 mm. Width: ♀, 1.3 mm.; ♂, .9 mm.

Vertex shorter than in *histrionicus*; clypeus continued in same plane as front at the base, then sloping sharply backwards, the basal portion overhanging the rest in the form of a bluntly-pointed tubercle; elytra short, truncate; venation distinct, the veins raised and densely reticulate.

Colour: gray or fuscous maculate, a broad, pale yellow median stripe on vertex; pronotum and scutellum margined by four pairs of black dashes; vertex with a pair of ocellate spots at base, and the margins mostly dark lined; front pale yellow, sometimes irregularly washed or marked with dusky, lateral compartments black, with the pustules white; clypeus black, the base and a line down to the apex of the tubercle light; lateral areas of pronotum and scutellum dark, with pustules light; elytra brownish fuscous, nervures light; abdomen above with a narrow median and three pairs of lateral stripes, the two outer pairs broad and pustulate; below, pale straw in the female, the femora spotted and the tibiæ lined with fuscous, the anterior pair much the heaviest. In the male the legs are always red, with more or less of fuscous marking. In some specimens the whole under surface, including clypeus, is bright red.

Described from twenty-four specimens collected in various parts of Colorado.

Peltonotellus bivittatus, n. sp.—Resembling *quadrivittatus* in general form and colour, the front much narrower and black lined. Size of *rugosus*.

Vertex three times as wide as its median length, two-thirds the length of the pronotum, front long and narrow, space between the lateral carinæ nearly twice as long as its middle width, only one-fourth wider in the middle than at the ends; clypeus abruptly rounding back, nearly right angled with front; elytra either coriaceous and only about half the length of the abdomen, venation indistinct, or else subhyaline, and much longer than the abdomen, the nervures distinct.

Colour: striped yellow and black, the yellow shading out to green on the vertex and front, a median line, broad in front, narrowing out behind, extending from the vertex to the tip of the abdomen, and a pair of oblique lines rising under the eyes and meeting the median line on the last abdominal segment, yellow; vertex green, margin and pair of spots at base black; front green, the lateral carinæ deep shining black; pustules on lateral areas of pronotum and scutellum black, lateral carinæ of scutellum and a pair of stripes just within them black; legs pale yellow.

Described from two specimens from Colorado, four from Nebraska, three from Kansas, and one from Iowa. One Kansas specimen was received from Crevecoeur; all the rest were collected by the author.

Kelisia salina, n. sp.—Form of *pallidula* nearly, but longer and narrower, resembling *crocea*, but much smaller, pale, with the carinæ of front margined with black. Length, 3.5 mm.

Vertex strongly carinate, one-third longer than wide, as long as the pronotum; front broader proportionally than in *crocea*, the margin slightly and regularly rounding, but little narrowed above; elytra long and closely appressed behind, the apex broadly rounded; venation as in *crocea*, the third apical nervure twice forked, the nervures studded with coarse dark hairs.

Colour: front pale smoky, the carinæ light, narrowly margined with black, which extends into the lateral foveæ of the vertex; basal part of vertex creamy; pronotum pale, with more or less of smoky clouding on the disc; scutellum creamy, often trilineate with pale. Legs and all below, except ovipositor and a few spots along margin, pale in the female, abdomen all dark in male.

Described from twenty-four specimens from various places in Colorado.

Kelisia parvula, n. sp.—Size of *pallidula* nearly, but with broader elytra, a shorter species than *salina*, with an unmarked front; front and above entirely pale. Length 3.25 mm.

Vertex weakly carinate, broad, but little longer than wide, rounding to front; front as in *salina;* elytra longer than abdomen, broad at apex; venation distinct, nervures strong and slightly setigerous, the third apical veinlet but once forked near the apex.

Colour: pale straw or whitish; vertex and scutellum tinged with orange, the abdomen in male smoky brown and black.

Described from one female from Coolidge, Kansas, and a pair from Ames, Iowa, all collected by the author.

MEGAMELANUS, n. gen.

Resembling *Megamelus*, but with the front of equal width above and below and the vertex sharply angled in front. Resembling *Delphacinus*, but with the side keels of the pronotum attaining the hind margin. Vertex 5-angular, but with the lateral foveæ depressed and their inner carinæ strong and meeting at the sharp apex, giving it the appearance of being acutely triangular; front broad, nearly rectangular, median carina distinct, not forked, a trifle the widest in the middle, the lateral margins gently evenly curving, the apical margin carinate just above the deep clypeal suture; clypeus small, rounding, without carinæ; pronotum shorter than vertex, strongly tricarinate, the lateral pair just inside and parallel with those on vertex, extending to the posterior margin; elytra commonly brachypterous, covering the second abdominal segment. In the macropterous form long and broadly rounding posteriorly; venation nearly as in *Megamelus*.

Type of the genus *M. bicolor*.

Megamelanus bicolor, n. sp.—General appearance of *Delphacinus mesomelas*, but with a sharper vertex and straight lateral carinæ on pronotum. Length: macropterous form, 3 mm.; brachypterous, ♀, 2.5 mm.; ♂, 1.6 mm.

Vertex flat, acutely triangular on the disc, slightly longer than the pronotum, more than half its length in advance of the eyes; median carina weak, obsolete before the middle; face slightly acutely angled with the vertex; front nearly half longer than wide, the carinæ sharp, narrow; pronotum sharply carinate, slightly emarginate posteriorly; elytra one-third longer than the vertex and pronotum in the brachypterous form, their apices rounding; nervures simple, distinct, distinctly longer than the abdomen in the macropterous form, broadly rounding at apex, anteapical cells variable, apical veinlets straight and simple.

Colour: females varying from a pale to a very bright straw colour, male pale straw colour; elytra nearly white, the abdomen both above and below clypeus and under side of thorax black. Legs black, the tip of both femora and tibiæ pale, tarsi pale.

A few males were found that mimic the females in size and colour. These were mostly parasitized, and it is possible that the others had been.

Described from twenty-five specimens from various parts of Colorado, and one female from California.

BOSTÆRA, n. gen.

Resembling *Stobæra*, but with a much broader vertex and front; vertex and front broader than in *Laccocera*, front bicarinate. Head transverse, wider than pronotum; vertex parallel margined, over three times as wide as long, not extending in front of eyes; front six-angled, widest at the lower corner of the eye, where it is a trifle wider than its median length, two and one-half times as wide as at apex, median carina forking at one-fourth its length from the apex and regularly diverging until its forks inclose over half the width at base; clypeus bearing an acutely-tipped, cone-shaped tubercle; antennæ very large, prominent, basal joint flat, second flat above, rounding below and tuberculate; pronotum transverse, slightly angularly excavated behind, lateral carinæ curving around behind eyes, not reaching the posterior margin; elytra about as in *Stobæra*, obliquely truncate behind, nervures with setigerous tubercles; tarsal spur broad, short, almost spoon-shaped.

Type *B. nasuta*.

The remarkably broad head, bicarinate front, and the "nose" on the clypeus, render this a very distinct and easily-recognized genus.

Bostæra nasuta, n. sp.—Slightly resembling *Laccocera vittatipennis*, but with a much broader head: pale creamy yellow, with a black band at apex of elytra and another before it. Length, 5 mm.

Vertex evenly rounding to the slightly-retreating front, slightly shorter than pronotum, not at all in advance of the eyes; elytra much longer than abdomen, as broad as in *S. tricarinata*, obliquely truncate at apex, the outer angle acute.

Colour: pale creamy yellow, the vertex and front shading to brownish on a line below the eyes. This line is margined below with white, which again shades out into brownish fuscous on the clypeus. Scutellum orange; elytra subhyaline, a spot on the suture before the apex of clavus; a band on apex and an oblique stripe before it, dark smoky brown or fuscous.

Genitalia: male plates strap-shaped, their inner margins notched before the apex; apical margins obliquely, roundingly excavated, their outer angles acute, upturned.

Described from ten examples from Holly, Antonito and Fort Collins, Colo., all collected by the author.

A NEW BEE OF THE GENUS BOMBOMELECTA.

BY T. D. A. COCKERELL, EAST LAS VEGAS, N. M.

Bombomelecta Arizonica, n. sp.— ♀. Length about 11 mm., black; head, thorax and legs with dull white hair, having a faint yellowish tinge; black hair on cheeks, lower sides of face, labrum and mandibles; hair of pleura, except its upper part, black; a conspicuous band of black hair between the wings; hair of anterior legs long and black, but the tarsi more or less silvery, and the femora with a conspicuous tuft of white hair near the end behind; middle tibiæ and tarsi largely silvery-white on the outer side, but the white and black pubescence are mixed, so as to produce a speckled effect; hind tibiæ and tarsi similar, except that the tibiæ have the outer apical half black; tegulæ large, black, punctured; wings pale brownish, nervures piceous; abdomen heart-shaped, with sparse black hair, and conspicuous clear-cut patches of white hair; first segment with a broad band of yellowish-white erect or suberect hairs, interrupted in the middle; first to fifth segments with lateral patches of appressed snow-white hair, that on the second segment broad and deeply notched behind. Clypeus shining and strongly punctured; front rough and dull; antennæ black, fairly long, last joint truncate; labrum about as broad as long; maxillary palpi six-jointed, the last joint minute; mandibles rather slender, with a low tooth on the inner side about the middle; scutellum with two short pyramidal spines; pygidial plate long and very narrow; apical ventral segment considerably but very narrowly produced; claws of hind legs bifid, not dilated. Spurs black, gently curved.

Hab.—Tempe, Arizona, end of March, 1902, visiting flowers of *Sphæralcea variabilis*. The flowers were also visited by *Halictus* and the honey-bee. This species is particularly interesting because in form, pubescence and colour it almost exactly imitates *Melecta grandis* from Algeria, a specimen of which I possess through the kindness of Mr. Vachal. The only obvious superficial difference is in size, the Algerian bee being considerably the larger. The significance of this appears when we recall that Tempe was selected as the location of the experimental date-palm orchard, because its climate most resembles that of Algeria and other parts of North Africa, the home of the date. *B. Arizonica* completely breaks down the supposed difference in pubescence between *Melecta* and *Bombomelecta;* among the known species it is closest to *B. Alfredi.*

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, A. M., ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 9.—Continued from p. 231.)

Family XXXII.—Bethylidæ.

1830. Proctotrypides, Family *(partim)*, Leach. Edinb. Ency., IX., p. 145.

1830. Mutillidæ, Family *(partim)*, Leach. *Opus cit.*, p. 147.

1839. Cenoptera, Tribe 6, Haliday. Hym. Syn., p. iii.

1839. Bethyllidæ, Family 20, Haliday. *Opus cit.*

1877. Cenoptera, Tribe 12, Förster. Ueber d. Syst. Werth d. Flügelg., p. 20.

This family was first defined by that astute British systematist, A. H. Haliday, who, as early as 1839, very correctly placed the family among the Fossores.

In 1893 the writer, in his Monograph of the North American Proctotrypidæ, followed the views of Prof. Westwood, and treated these insects as a subfamily in the Proctotrypidæ. Since that time, however, the extensive studies I have made into all families of the Hymenoptera have given me a much broader and more thorough knowledge of the families and their affinities, and I am now convinced that Haliday was right, that these insects are allied to the fossorial wasps, and have nothing to do with genuine Proctotrypoids; they are clearly allied to the *Chrysididæ*, through the *Cleptinæ* and *Ameriginæ*, and to the *Sapygidæ*, *Tiphiidæ*, *Cosilidæ*, *Thynnidæ*, *Myrmosidæ* and *Mutillidæ*,—all *parasitic* families.

The family *Trigonalidæ*, too, which is usually classified with the terebrant Hymenoptera, also belongs to the same category, being undoubtedly allied to the *Bethylidæ* and the *Sapygidæ*, the two-jointed trochanters, the long multiarticulate antennæ, and the superficial resemblance to genuine ichneumonids having misled most systematists as to its true position.

In this connection it may be well to call special attention to the new Bethylid genus, *Probethylus*, discovered by Mr. E. A. Schwarz, in Arizona, with 23-jointed antennæ, and to the genus *Sclerogibba*, Stefani,

with 26-jointed antennæ, since these genera differ so widely in antennal characters from others in the group, and apparently emphasize the affinities between these wasps.

Table of Subfamilies.

Wingless forms ..... 3.
Winged, the hind wings with a lobe at base; front wings with one or two basal cells.
Head not oblong ..... 2.
Head oblong.
Antennæ inserted at the clypeus, usually 12- or 13-jointed, rarely 23- or 26-jointed; front femora usually more or less swollen ..... Subfamily I.—Bethylinæ.

2. Head globose or rounded; front wings with a lanceolate stigma; front tarsi in ♀ never chelate; antennæ in ♀ 13-jointed, in ♂ 10-jointed ..... Subfamily II. —Emboleminæ.
Head transverse or subquadrate; front wings usually with a large stigma; front tarsi in ♀ frequently chelate; antennæ 10-jointed in both sexes ..... Subfamily III.—Dryininæ.

3. Front femora much swollen.
Head oblong; antennæ usually 12- or 13-jointed, alike in both sexes, rarely 23–26-jointed ..... I.—Bethylinæ.
Head transverse or subquadrate, or globose.
Head globose; antennæ in ♀ 13-jointed; front tarsi normal ..... II.—Emboleminæ.
Head transverse or subquadrate; antennæ 10 jointed; front tarsi in ♀ chelate ..... III.—Dryininæ.

Subfamily I.—Bethylinæ.

This subfamily may be divided into two very distinct tribes:

Table of Tribes.

Antennæ 23- to 26-jointed ..... Tribe I.—Sclerogibbini.
Antennæ 12- to 13-jointed ..... Tribe II.—Bethylini.

Tribe I.—Sclerogibbini.

In this tribe only two genera are known, and they are easily recognized from other Bethylids by the multiarticulated antennæ, the antennæ being 23- or 26-jointed. In the Bethylini the antennæ are never more than 13-jointed.

Table of Genera.

1. Males ..... 2.
Females.
Wingless.
Antennæ 26-jointed; ocelli wanting (♂ unknown ..... (1) Sclerogibba, Stefani.
(Type S. crassifemorata, Stef.)
2. Front wings with a closed marginal cell *without* discoidal cells; antennæ 23-jointed (♀ unknown)..(2) Probethylus, Ashmead, g. nov.
(Type P. Schwarzi, Ashmead, MS.)

Tribe II.—Bethylini.

The antennæ are 12- or 13-jointed, alike in both sexes. Among the females, wingless forms are common, and in many cases are totally different from the males, so that the sexes are not easily correlated.

Many of them, too, were it not for their oblong heads, could be easily mistaken for apterous females in the families Thynnidæ and Mutillidæ.

Table of Genera.

1. Males ..... 18.
Females.
Wingless forms ..... 2.
Winged forms ..... 10.
2. Head *with* ocelli ..... 9.
Head *without* ocelli; antennæ 13-jointed ..... 3.
3. Metathorax quadrate or nearly, not much constricted at the base . 5.
Metathorax not quadrate, much constricted or strangulated at base . 4.
4. Scutellum present; mandibles 3- or 4-dentate; maxillary palpi 6-jointed ..... (1) Pristocera, Klug.
(Type Bethylus depressa, Fabr.)
Scutellum wanting; mandibles 3-dentate; maxillary palpi 6-jointed ..... (2) Isobrachium, Förster.
(Type Omalus fuscicornis, Nees.)
5. Scutellum present; metathorax quadrate or trapezoidal ..... 6.
Scutellum wanting; metathorax rounded off posteriorly ..... (3) Ecitopria, Wasmann.
(Type E. crassicornis, Wasm.)
6. Mandibles 2- or 3-dentate; maxillary palpi 4-jointed ..... 7.
Mandibles 4-dentate; maxillary palpi 5-jointed ..... (4) Scleroderma, Latreille.
(Type S. domesticus, Latr.)

7. Mandibles 2-dentate.....8.
Mandibles 3-dentate.....(5) Dissemphalus, Ashmead.
(Type D. xanthopus, Ashm.)

8. Maxillary palpi normal; labial palpi 3-jointed.....(6) Ateleopterus, Förster.
(Type A. Försteri, Kirchner.)

Maxillary palpi deformed; labial palpi 3-jointed.....(7) Apenesia, Westwood.
(Type A. amazonica, Westw.)

9. Antennæ 12-jointed; maxillary palpi 4-jointed.....(8) Cephalonomia, Westwood.
(Type C. formiciformis, Westw.)

10. Front wings *with* a stigmated marginal vein and a marginal cell, the radial vein always well developed.....13.
Front wings *without* a stigmated marginal vein and marginal cell, the radial vein not at all or only slightly developed, sometimes wholly absent.....11.

11. Front wings *with* a short linear marginal vein and a short radius..12.
Front wings *without* a marginal and a radial vein.
One basal cell; antennæ 13-jointed...(6) Ateleopterus, Förster.
No basal cell; antennæ 12-jointed..(8) Cephalonomia, Westwood.

12. Two basal cells about of an equal length.
Antennæ 13-jointed.....(9) Laelius, Ashmead.
(Type L. trogodermatis, Ashm.)
Antennæ 12-jointed.....(10) Bethylus, Latreille.
(Type B. cenopterus, Latr.)

13. Basal vein *with* a branch directed backwards, sometimes forming a small closed cell; parastigma usually present.....17.
Basal vein *without* such a branch; no parastigma.
Front wings with an *incomplete* or open marginal cell.....14.
Front wings with a complete marginal cell; antennæ 13-jointed.
With *one* discoidal cell.....(11) Sierola, Cameron.
(Type S. testaceipes, Cam.)
With *two* discoidal cells.....(12) Eupsenella, Westwood.
(Type E. agilis, Westw.)

14. Mesonotum *without* furrows, or the furrows are incomplete and indistinct.....16.

Mesonotum *with* distinct, complete furrows.....15.

15. Antennæ 13-jointed, maxillary palpi 6-, labial palpi 3-jointed.
Scutellum bifoveate at base.....(13) Mesitius, Spinola.
(Type M. Ghilianii, Spin.)
Scutellum not bifoveate at base, but with a transverse grooved line.
Maxilla bilobed at apex.....(14) Epyrus, Westwood.
(Type E. niger, Westw.)
Maxilla trilobed at apex.....(15) Calyoza, Westwood.
(Type C. staphylinoides, Westw.)

16. Antennæ 12-jointed.....(16) Anoxus, Thomson.
(Type A. boops, Thoms.)
Antennæ 13-jointed.
Scutellum bifoveate at base.....(13) Mesitius, Spinola.
? = Dolus, Motsch.
(Type M. Ghilianii, Spinola.)
Scutellum with a transverse grooved line at base.....(14) Epyris, Westwood.
(Type E. niger, Westw.)

17. Antennæ 12-jointed.....(16) Perisemus, Förster.
(Type P. Triareolatus, Först.)
Antennæ 13-jointed.....(17) Goniozus, Förster.
(Type G. clavipennis, Först.)

18. Front wings *with* a distinct marginal cell, the radius always long, sometimes forming a closed marginal cell.....23.
Front wings *without* a distinct marginal cell, the radius wanting or very short.....19.

19. Front wings *with* a short linear marginal vein and a short radius..21.
Front wings *without* marginal and radial veins.....20.

20. Antennæ 12-jointed.....(8) Cephalonomia, Westwood.
Antennæ 13-jointed.
Front wings with *one* basal cell.....(6) Ateleopterus, Förster.
Front wings with *two* basal cells.....Scleroderma, Klug.

21. Two basal cells in front wings.
Antennæ 13-jointed.....Laelius, Ashmead.
Antennæ 12-jointed.....Bethylus, Latreille.

22. Front wings with an *incomplete* marginal cell.....22.
Front wings with a complete or closed marginal cell.

Antennæ 13-jointed.

One discoidal cell.. .....(11) Sierola, Cam.

Two discoidal cells.....(12) Eupsenella, Westwood.

23. Basal nervure *without* a backward-directed branch; no parastigma..24.

Basal nervure *with* a branch directed backwards ; a parastigma...27.

24. Mesonotum *without* furrows, or the furrows very indistinct.....26.

Mesonotum *with* furrows distinct.....25.

25. Antennæ 13-jointed, simple, not ramose.

Scutellum bifoveate at base; maxilla terminating in *two* lobes.....(14) Epyris, Westwood.

Scutellum with a transverse furrow or fovea at base; maxilla with three lobes.....(13) Mesitius, Spinola.

Antennæ 13-jointed, *ramose*.....(15) Calyoza, Westwood.
(Type C. staphylinoides, Westw.)

26 Antennæ 12-jointed ; eyes hairy.....(16) Anoxus, Thomson.

Antennæ 13-jointed.

Mandibles long, slender, bifid at apex.....(7) Apenesia, Westw.
Laelius, Ashmead.

Mandibles 4- to 6-dentate.

Scutellum bifoveate at base.....(13) Mesitius.

Scutellum with a transverse grooved line or furrow at base.....(14) Epyris, Westwood.

27. Antennæ 12-jointed.....(16) Perisimus, Förster.

Antennæ 13-jointed.....(17) Goniozus, Förster.

A TORTOISE-BEETLE NEW TO QUEBEC.

BY THE REV. THOS. W. FYLES, LEVIS, P. Q.

In July last I noticed that the leaves of the burdocks on the Heights of Levis were riddled as if from a discharge of small shot. On examination, I found that the damage to the leaves was caused by numerous larvæ of a species of Cassida. The creatures were there in strength, each supporting, by means of the forked prolongation of its anal segment, its "stercoraceous parasol." Towards the end of the month the grim-looking pupæ were to be seen, bristling round their edges with white branched spines, and attached to the leaves by a natural cement. In the present month (August) the beetles have appeared. They are about eight millimetres in length and five millimetres in breadth. The elytra and the thoracic shield are pea-green and are closely indented.

The body-colour is dark brown, approaching to black. The antennæ are moniliform and somewhat clavate; for part of their length they are pale green and for the rest light brown. The thighs are brown, and the tibiæ and tarsi are pale green. The tarsi are four-jointed.

This insect, I take it, is the *Cassida viridis* of Linnæus, advanced from Europe. It is in such numbers that it is evidently well established—is come to stay; and, as it feeds on the burdock and Canada thistle, nobody, I presume, will object to its advent.

HYDRŒCIA NELITA, STRECKER.

BY HENRY H. LYMAN, MONTREAL.

In Supplement No. 1 to his work "Lepidoptera, Rhopaloceres and Heteroceres, Indigenous and Exotic," dated Sept. 15th, 1898, Dr. Herman Strecker described a species under the above name as follows:

"At first glance might be taken for a small *Nitela*, but it is a darker, warmer colour, more towards a rich chestnut. The t. p. is not so conspicuous, and is much more upright, and its course is rather from the costa outwardly oblique than inwardly oblique. One example has the space from the base to t. p. chestnut brown, exteriorly the t. p. is accompanied by a broad, paler ashen shade, beyond which the brown again prevails. In another the whole wing is brown, the t. p. only being discernible on the closest inspection. Beyond what I have mentioned, the differences between this and *Nitela*, excepting size, are not very marked. Expands one inch. Types, two examples from Chicago, Illinois."

When I attended the annual meeting of the A. A. A. S. at Pittsburg, at the end of June and beginning of July last, I took with me, among other things, two of my types of *Gortyna Ærata*. When I showed my specimens to Dr. Holland, he immediately expressed the opinion that these two belonged to *Necopina*, showing that he also saw the close resemblance to that species.

When, however, I showed them to Dr. J. B. Smith, he asked me if the flown specimen which Mr. Winn had given to Mr. Bird was of the same species, for if so, the species was *Nelita*, Strecker. I immediately arranged to visit Reading, in order to see the types of Strecker's species, and upon comparing the types of *Ærata* with them, I was forced to the conclusion that Dr. Smith was right.

I greatly regret having created a synonym, but I have sinned in the best of entomological company, and do not think I can be blamed for not having recognized in my beautiful bred specimens the species so inadequately described by Dr. Strecker from a pair of flown dwarfs.

THREE NEW GOMPHINES.

BY JAMES G. NEEDHAM, LAKE FOREST, ILL.

Herewith I offer descriptions of three new species of dragon-flies of the subfamily Gomphinæ of Odonata. Figures of the appendages of all will appear in my forthcoming handbook of the dragon-flies of North America.

Gomphus lentulus, n. sp.

Length 49 mm., abdomen 34 mm., hind wing 29 mm.

Colours obscure (due in part to fading of specimen); face obscure yellowish, shining; frons above and occiput and the ridges above the lateral ocelli yellow, the remainder of the vertex brownish. Prothorax brownish, with a double median spot of yellow on the dorsum. Thorax obscure yellowish, with a faint indication of a pair of narrow stripes of brown beside the middorsal carina, and of broader antehumeral and humeral stripes; a brown pale line on the third lateral suture. Legs black, hairy (male), with coxæ, trochanters, external (dorsal) face of the tibiæ and of the two basal segments of the tarsi yellow. Wings hyaline, costa yellow, stigma fulvous, covering 5–6 cells; antecubitals 13–14 on the fore wings, 9–10 on the hind wings; postcubitals 10–11 on all wings; no anal loop, but veins A1 and A2 are widely separated at base, and there is a single elongated cell between, as is usual in *G. villosipes;* between the anal triangle and this cell there is but one other cell bordering on the anal vein.

Abdomen brownish, broadly streaked with yellow longitudinally on segments 1–4, becoming suffused with rufous on segments 7–9; segment 10 and appendages yellow; segment 9 cut very obliquely at apex, longer on the dorsal side, its lateral margins little dilated. Superior appendages shorter than the inferiors, strongly divergent, straight, scarcely tapering, suddenly obliquely truncate on end, with an acute internal angle and a broad, black caruncle under the obtuse external angle. Inferior appendage roundly divided, its forks not wider apart than are the two superior appendages, straight, tapering to the darker coloured, sharply-upcurved tips.

A single male specimen, collected end of June, 1898, five miles north-east of Flora, Ill., Little Wabash River, by J. F. Garber, in the collection of Mr. Chas A. Hart, who has very kindly offered me the specimen for description. It belongs to the subgenus Arigomphus, and *G. pallidus* is perhaps its nearest ally.

Gomphus cavillaris, n. sp.

Length 41 mm., abdomen 30 mm., hind wing 24 mm.

Face yellow, tinged with brown on the sutures and on the middle of the labrum. Vertex blackish, except the postocellar ridge and a narrow basal ring around each antenna. Occiput yellow, straight, or very slightly convex at its ends, with a thin fringe of black hairs.

Prothorax brown, with median and lateral spots of greenish yellow. Dorsum of the thorax greenish yellow, with a triangular median stripe of brown, divided on the carina, greatly dilated below, almost interrupted on the collar. Humeral and antehumeral stripes distinct, the latter isolated above. Sides greenish yellow, with narrow pale brown stripes on sutures. Legs entirely reddish beyond the trochanters, with black spines and black-tipped claws. Wings hyaline, costa yellow, stigma fulvous. Antecubitals of fore wing 9, of hind wing 7, postcubitals 6–7 on all wings; the 1st and 4th antecubitals of the hind wings hypertrophied.

Abdomen brown, with ill-defined middorsal stripe of yellowish green, disappearing on segments 8 and 9. Sides of segments 1 and 2, including the auricles and base of 3, greenish yellow; indistinct lateral paler marks also on 4–6; sides of 7–9 bright yellow inferiorly, superiorly fulvous; 10 brown, paler below; appendages brown. Apex of segment 8 cut very obliquely, longer on the dorsal side.

Appendages brown, the superiors scarcely longer than the inferiors, and scarcely more divergent, obliquely truncate, with the inner angle produced into a long, straight, posteriorly-directed point, the external angle also acute, short, situated at two-thirds their length. Viewed from the side, the external angle presents an inferior tooth, and beyond it on the outer margin are two other smaller teeth before the apex, one near the

tooth first named, with a distinct notch intervening, and the other near the apex; branches of the inferior appendage tapering, upcurved, their tips appearing outside the inner angle of the superiors.

Vulvar lamina of female completely divided into two short, broad lobes, and hind femora each with a double row of less numerous, much longer and stronger spines, otherwise similar to the male.

One male, Ft. Reed, Fla., 6th March, 1876, collected by Professor J. H. Comstock, and in the Cornell University collection; and a number of specimens of both sexes, Gotha, Fla., 27th and 28th February, collected by Miss Matilda Wichtendahl, and in the collection of Mr. C. C. Adams.

Our smallest species; as closely related to *G. militaris* as to any other.

Ophiogomphus phaleratus, n. sp.

Length 47 mm., abdomen 35 mm., hind wing 30 mm.

Face yellow, vertex black, except two rings on the base of each antenna, two minute crescents surrounding the lateral ocelli in front, the ends of the postocellar ridge and a spot on the rear, including the middle of this ridge; occiput yellow, with a thin fringe of brown hair on the straight hind margin.

Thorax thinly pubescent; prothorax brown, with a yellow twin spot on the middle and a larger yellow spot on each side. Dorsum of thorax with a moderate stripe of brown, divided by yellow on the middle of the carina, contracted on the collar; humeral and antehumeral stripes of brown, confluent above and below, around a narrow dividing line of yellow. Sides of thorax yellow, with narrow lines of pale brown on the sutures. Legs yellow, a blackish spot on the apical fourth of the femora above, tibiæ and tarsi black, with a yellow stripe on the external face of the tibiæ; knees yellow. Wings hyaline; costa yellow, stigma pale brown; antecubitals of the fore wing 31, of the hind wing 9, postcubitals of all wings 9–10.

Abdomen brownish, with a row of broad spots on the dorsum of segments 1–9, covering segment 1, restricted to the basal two-thirds of segments 2–9, best defined on the middle segments. Segment 10 wholly

yellow. Sides of segments 1–3 yellow, including the auricles; sides of 7–9 broadly yellow, with apical ventral angles bordered with black; appendages yellow.

Appendages yellow, the superiors one-third longer than the inferior, hardly as long as the 9th abdominal segment. Viewed from above, the superiors are arcuate, approximated at apex around an oval space, but not quite touching, smoothly rounded externally; the inferior shows an oval apical cleft, whose depth equals one-third the length of that appendage. Viewed from the side, the superiors are broad at base, suddenly contracted just beyond, and then cylindric and regularly declined to apex, with the superior margin regularly curving from base to apex; a straight row of half a dozen black denticles beneath the apical third; apex obtuse. Inferior declined at base and upcurved at apex, its superior margin forming a regular semicircular curve; apices hidden between superiors, each bearing a little superior tooth.

A single male specimen collected at Corvallis, Oregon, June 6th, by Prof. A. B. Cordley, by whose generosity the specimen is now in the collection of the writer.

NOTES.

We regret to record the death of Mr. R. J. Weith, of Elkhart, Indiana, which took place on Sunday, September 21st, after an illness of only two days, from appendicitis. Mr. Weith was born in Prussia, on the 15th of September, 1847. At the age of twenty-five he came to America, and after visiting many of the large cities in the east and south, finally settled at Elkhart, where he lived for about a quarter of a century. For many years he devoted himself to the study of entomology and the collection of insects, especially Hymenoptera, and made many notable captures.

Mr. Otis W. Barrett, formerly of Tacubaya, Mexico, is now at the Agricultural Experiment Station, Mayagüez, Porto Rico, and desires his correspondents to take note of his new address.

The Annual Meeting of the Entomological Society of Ontario will be held in London, on Wednesday and Thursday, October 29th and 30th.

Mailed October 9th, 1902.

The Canadian Entomologist.

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THE LIFE-HISTORY OF THE VARIABLE CUTWORM, *MAMESTRA ATLANTICA*, GRT.

BY DR. JAMES FLETCHER AND ARTHUR GIBSON, OTTAWA.

In the Report of the Dominion Entomologist for 1901 a notice was given of this insect, the moth of which has for some years at Ottawa been one of the commonest species of the genus found flying during the summer. Any species as abundant as this is must be injurious, should the caterpillars at any time attack a cultivated crop. The larvæ have occasionally been found in vegetable gardens, around peas and beet root, but no injury as yet has been noticed. The finding of a cluster of eggs last year by Mr. Gibson gave an opportunity of studying the life-history, which is herewith submitted.

On the 6th June, 1901, a batch of about 90 eggs of *Mamestra atlantica*, Grt., was found at Ottawa on *Lonicera caprifolium*, Linn. The eggs were laid on the upper surface of a leaf, in a compact heap of three layers.

Egg.—Dome-shaped, slightly smaller at the base than just above it, where it is widest; height, 0.4 mm.; width, 0.6 mm. In general appearance similar to the eggs of *Peridroma saucia*, Hbn., which have been so often figured. The micropyle is conspicuous, surrounded by about 5 rings of large cells. The ribs, about 24 in number, all divide once, and some of them twice, before they reach the base. The large cells, which show plainly above the point where the ribs divide, occur over the whole surface of the egg, forming a network connecting the ribs. When found, the eggs were of a pinkish shade.

The eggs hatched during the morning of the 10th June.

Stage I.—Length after hatching, 2.3 mm., of a dirty whitish colour, alimentary canal showing dark through the skin. After feeding, the colour is pale green. Head 0.4 mm., wide, large, rather flat in front, pale brown; mandibles reddish; ocelli dark; hairs on face black, each of which is

encircled by a dark brown spot. Besides these dark spots, there are smaller dots and short dashes of brown on the face, particularly near vertex. Cervical shield very pale brown, inconspicuous, on the front of which are 4 large black tubercles, and 4 smaller ones on the hind margin. Body cylindrical, skin shiny, appearing to be slightly wrinkled under a lens. Tubercles large, black, shiny, each bearing one bristle. Bristles long, stiff and black; tubercles i, iii and v in a line, iv close behind spiracles, which are small and black. Thoracic feet and prolegs concolorous with venter, plates on thoracic feet shiny black. The first two pairs of abdominal feet aborted.

On the 13th June the larvæ were quiet and swollen, ready for the first moult. At this time they were pallid. By the 14th nearly all had moulted.

Stage II.—Length, 5 mm. Head 0.6 mm. wide, round, slightly depressed and bilobed at vertex, greenish white, mottled with large and small blackish spots, the large spots at the base of each hair; ocelli dark; antennæ pale; tips of mandibles reddish. Cervical shield concolorous with body, and inconspicuous. Body above spiracles a dirty gray, some specimens greenish gray; ventral surface pale greenish. A pale whitish dorsal stripe is now apparent, also two whitish lateral stripes, one just below tubercle ii, the other just above tubercle iii. There is also a substigmatal band just below spiracles, touching tubercle iv. Tubercles as before, black, shiny, each bearing one black bristle. Skin of body smooth and shiny. Spiracles black, very small. Thoracic feet slightly darker than ventral surface and bearing blackish plates as before. Prolegs concolorous with venter; lower edge of claspers dark.

On the 15th June some were swollen and ready for the second moult. On the 16th nearly all moulted.

Stage III.—Length, 9.5 mm. Head 0.9 to 1.0 mm. wide, slightly depressed at apex, pale green, mottled or spotted as before, the large spots at base of each hair on face being black, and the smaller spots, which are mostly on the upper inner half of cheek, being brown; mandibles reddish; antennæ pale, darkened towards tips. Body cylindrical, dull greenish above spiracles, paler green beneath substigmatal band. In a few specimens the colour of the body above the spiracles is a dull reddish-brown. Dorsal and upper lateral stripes whitish. The lateral stripe apparent in last stage just above tubercle iii is very faint, but can be observed under a lens. The substigmatal band is a clear light

yellow, and is the most conspicuous marking on the body. The black tubercles are as before, but at the base of each there is a pale circle. Spiracles whitish, rimmed with black. Thoracic feet and prolegs concolorous with venter, thoracic feet darkened at tips. Claspers of prolegs slightly reddish; bristles pale and short.

On the 18th June a few larvæ passed the third moult, and on the 19th nearly all the remaining specimens moulted.

Stage IV.—Length 12.5 mm. Head 1.2 to 1.4 mm. wide, shaped as before, pale brown, finely mottled with darker brown, particularly on upper half of cheek; each hair on face encircled at base with black; antennæ and mandibles as before; ocelli dark. Body above spiracles dull brown with a greenish and a reddish tinge, below spiracles paler, namely, greenish brown with a reddish tinge. The colour of a few specimens above the spiracles is dull greenish, as in the case of the majority of specimens in last stage. Dorsal and upper lateral stripes whitish, distinct, edged with blackish brown; the lower lateral stripe just above tubercle iii very faint, as in Stage III. Substigmatal band very wide and conspicuous, of a bright light yellow colour, with a bright red stripe running through the lower half. Tubercles black, small, shiny, each with a pale circle at base, as in last stage; bristles very short and black. Spiracles yellowish, rimmed with black. Thoracic feet and prolegs pale, of a translucent appearance, all the feet spotted with black; bristles short.

On the 23rd June many of the larvæ passed the fourth moult, others a day or two following.

Stage V.—Length, 15 mm. Head 1.6 to 1.7 mm. wide, as in last stage, testaceous, mottled with darker brown. In this stage most of the larvæ are of an apple-green colour, only a very few being dull brown or reddish above spiracles; otherwise the larvæ are much the same as in the last stage. The pale lower lateral stripe just above tubercle iii has now disappeared, and the only stripes on the body are the dorsal and upper lateral (which afterwards will be mentioned as the lateral), and the wide, conspicuous substigmatal band. In the green larvæ the dorsal and lateral stripes are white, both bordered on each side with dark green, the dorsal stripe being the more heavily bordered. The substigmatal band is bright pale yellow, with no red on it. In the larvæ, which are reddish above spiracles, the substigmatal band is yellow, with some red on it, but not so much as in last stage. The dorsal and lateral stripes are not so white as

in the green specimens, and are bordered by dark brown. The ventral surface of all the specimens is slightly paler than the dorsal. Tubercles black and very small. Thoracic feet and prolegs concolorous with venter.

On the 27th June some of the specimens passed the fifth moult, the remainder on the 28th and 29th.

Stage VI.—Length 23 mm. Head 2.0 to 2.3 mm. wide, as before, testaceous, mottled and reticulated with dark brown. The larvæ in this stage are almost the same as in the last. Nearly half the specimens are brownish, some having a slight reddish shade, the venter being of a paler brown than the dorsum. The majority of the larvæ, however, are of an apple-green colour, with the venter slightly paler. The whole skin is spotted with white. Dorsal stripe heavily bordered on either side with blackish brown. Lateral stripe also bordered with the same colour, but not so heavily. Substigmatal band pale yellow, the lower half being brownish red. In the green specimens the dorsal and lateral stripes are not so conspicuous as in the dark larvæ, and are only faintly bordered with dark green, the substigmatal band being bright yellow, with no red in it whatever. The spiracles are white, lined with black, in both the brown and the green larvæ. Tubercles small, black bristles short. In the green specimens the cervical shield is concolorous with the body. In the dark specimens the shield is noticeable, being of a darker colour than the body. Thoracic feet and prolegs all concolorous with venter.

On the 30th June several larvæ passed the sixth moult, and by 3rd July nearly all had moulted.

Stage VII.—Length, 29 mm. Head 2.8 to 3.1 mm., as in last stage. The intensity of the colour of the head, as is natural in a caterpillar presenting such a wide range of colour variation, varies in different specimens, but, on the whole, becomes darker and the markings more distinct with each moult. The larvæ in this stage are of two colours as before. For a day or so after moulting, the dorsal and lateral stripes are very conspicuous. After a few days the lateral stripe is not so plain as at first, and in some specimens is interrupted. The dorsal stripe remains conspicuous, and has the appearance of a blackish band with a medio-dorsal line of pale yellow. The substigmatal band is very wide, pale bright yellow, many specimens, both green and brownish, having the lower half suffused with light red. This band is very conspicuous, and extends from the front edge of segment 2 right

down to the base of the anal feet. In the larvæ of both colours the venter is slightly lighter than the dorsum. Cervical shield slightly darker than body. In all the specimens the whole skin above the stigmatal band is densely mottled with minute black blotches and streaks. In some of the brown specimens the skin between the dorsal and lateral stripes, and lateral stripe and substigmatal band, has a decidedly reddish tinge, chiefly along the lower edge of the lateral stripe. In a very few specimens traces are evident of the lower lateral stripe which was plain in Stages II., III. and IV. Tubercles normal, very small, black, each on a small black spot; bristles short. Tubercle iv. is in a straight line close behind the centre of the spiracle. Spiracles yellowish, ringed with black. Thoracic feet and prolegs concolorous with venter; thoracic feet tipped with black. Tips of claspers of prolegs dark.

The mature larva is 37 mm. in length at rest, and 40 mm. when extended.

In the Report of the Dominion Entomologist, mentioned above, at page 237, the following general description of the full-grown larva is given :

"The general appearance of these caterpillars may be described as follows: The ground colour of the body, which varies remarkably in different specimens of the same brood, ranges from yellowish-green, through a dull yellow ochre, a ruddy brown, to a dark umber brown. The markings may be described as minute mottlings, dots and streaks aggregated on the dorsal area into a regular pattern consisting of a medio-dorsal continuous band, with a pale disconnected narrow line in the centre, and two lateral less-connected stripes also centred with a pale thread and of about the same intensity as the medio-dorsal band. The space between the lateral stripes is closely speckled with black dots. The stigmatal stripe is black, narrow and distinct, and close beneath it is a wide, conspicuous, yellow substigmatal band with the ground colour showing through it in places. The ventral surface is slightly paler than the dorsal. The head is honey yellow, mottled with darker markings."

It will be noticed that in the above extract the conspicuous dark shading above the substigmatal band has been given the value of a definite stripe, and referred to as the stigmatal stripe.

On the 6th July nine specimens buried, and the rest soon followed. A slight cocoon is formed apparently without any silk.

The pupa averages 17 mm. in length by 5.5 mm. in width; colour dark mahogany brown, polished. Thorax, wing-cases, etc., finely wrinkled with transverse lines; abdomen polished, the segments finely punctured at base. Cremaster stout, rugose above, excavated beneath, with two very short points about half way from base, one on each side, and at the tip two slender, divergent and capitate spines 0.4 mm. in length.

The first moth emerged on the 17th July, and others appeared during the following fortnight. About half the brood wintered over as pupæ, the first spring moth appearing on the 15th April (in a cool cellar). This was probably a month earlier than would have been the case out of doors.

Food-plants.—As the eggs from which these larvæ were reared were found on the European honeysuckle, leaves of this plant and many other shrubs were offered to them. The larvæ, however, avoided the honeysuckle, and the only plants eaten to any measure were the red oak, curled dock, willows and poplar. Of these, a note was made that the oak was decidedly the favourite food-plant. Later, however, the leaves of all woody-stemmed plants were refused, and plantain, dandelion and a few other low-growing herbs were fed to them, plantain being the most eaten.

NORTHWEST (CANADA) ENTOMOLOGICAL SOCIETY.

The fourth annual meeting of this Society will be held on Wednesday, November 5th, 1902, at 3 p. m., in the High School, Calgary, Alta. Among other things it is proposed to devise an extension of its work on the lines of a Natural History Society, and to that end to adopt as its title, "The Northwest Natural History Society," or a similar title. His Lordship the Bishop of Saskatchewan and Calgary will preside, and the Department of Agriculture will be represented. If this extension is carried out, the various objects will be entrusted to divisions of entomology, botany, ornithology, etc., with a central presiding officer at Regina.

TWO NEW ANTS'-NEST COCCIDS FROM TEXAS.

BY GEO. B. KING, LAWRENCE, MASS.

Dactylopius Wheeleri, n. sp.— ♀ flesh colour, covered with a white, fluffy material, elongate oval, 1¾ mm. long, 1 broad, ½ high, convex, very flat beneath. Segmentation distinct. Boiled in potash, they turn brown; transferred to cold water, the internal juice becomes colourless. Pressed under cover-glass, the skin is colourless, with several long hairs anteriorly and on the caudal region above the anal ring and caudal tubercles. Anal ring normal, with six stout bristles. Caudal tubercles very prominent, with two long bristles 120 and 260 μ long. Legs stout, front leg coxa 140. Femur and trochanter 220. Tibia 148. Tarsus 100 μ long. Claw thin, sharp, with a distinct tooth near the end. Tibia and tarsus have several short hairs. Digitules of tarsus and claw very small. Labium small. Rostral loop exceedingly long.

Antennæ 7-jointed: Joint (1) 48, (2) 52, (3) 52, (4) 44, (5) 40, (6) 40, (7) 100. Formula 7(23)14(56) of a finished mount in balsam. The same examples measured, while they were wet with alcohol under cover-glass, as follows: Joint (1) 40, (2) 60, (3) 44, (4) 44, (5) 44, (6) 44, (7) 104. Formula 72(3456)1. All the joints have several short hairs, excepting joint 7, which has two long hairs at the tip of that joint. Antennæ 216 μ apart. Eyes large, oval.

Hab.—Austin, Texas, in nests of *Camponotus maculatus*, var. *sansabeanus*, Buckley. Collected and sent to me for study by Prof. William M. Wheeler, of the University of Texas, who says the ants remove the coccids to their chambers when the nests are disturbed, and that they are very frequently met with. I have given the measurements of the several joints of the antennæ while wet and hardened in alcohol and a finished mount in balsam, for the purpose of calling attention to the variability of the antennal joints under each process. Owing to our large list of Coccidæ now described, it seems to the writer that all such changes should be recorded, so as to assist in every way possible the identification of the species if found in another locality or country. This is the first ant-nest coccid from Texas, and the first species of the genus *Camponotus* found in North America to harbour coccids in its nest.

Eriococcus Texanus, n. sp.—The females of this species received from Prof. Wheeler were in alcohol, and seemed to be flesh colour; when placed in liquid potash, they turn red-brown. "When alive, they are of a peculiar green colour" (Wheeler).

♀, examined with a hand lens, very much resembling a *Dactylopius* naked, i. e., without ovisac, distinctly segmented, oval, tapering behind, plump, 2½ mm. long, 1¾ broad. Boiled in K. O. H., the derm is tinged with yellow, with spines of the normal type and confined to sides, short, 20 μ long, those of the outer margin twice as long; several spine-like long hairs of two sizes are found scattered irregularly over the body, 28x60 μ long, and some round gland-pits. Antennæ, legs and mouth-parts light brown. Antennæ 6-jointed: Joints (1) 40, (2) 40, (3) 112, (4) 28, (5) 28, (6) 40 μ long.

Legs long and stout.

Front leg coxa,	120.	Femur and trochanter	200.	Tibia	120.	Tarsus	132.
Middle "	120.	" "	216.	"	120.	"	133.
Hind "	180.	" "	220.	"	140.	"	180.

Claws 6 μ long, stout, curved and thin towards the end. Digitules of tarsus filiform, with small knobbed ends. Anal ring normal, with 8 bristles, which are thin, 100 μ long. Posterior tubercles large and rounded, about 80 μ long and broad, with one long bristle and four stout spines 24 μ long.

Hab.—San Angelo, Texas, on roots or young shoots in the earthen nests of *Cremastogaster punctulata*, Emery. "They were undoubtedly being cultivated by the ants" (Wheeler). Collected by Prof. Wheeler, March, 1902. Its nearest North American ally is *Eriococcus Tinsleyi*, Ckll., which has in the hind leg a very long tarsus as in *E. Texanus*, but differs very materially in other respects; in the antennæ a general type of *E. Palmeri*, Ckll., but in *Texanus* joint 3 is very much longer than in *Palmeri*.

This is the first species of the genus *Eriococcus* known to inhabit ants' nests. The absence of an ovisac in this species is no doubt due to the habit of the ants lapping the bodies of the coccids, and thus preventing a sac from forming. In a recent letter from Prof. Cockerell, he says: "If this really has no ovisac, even when producing eggs, it is not an *Eriococcus*, but a *Rhizococcus*. Such forms occur in Australia, and Signoret recorded one from Europe. *Rhizococcus* is to *Eriococcus* as *Calymnatus* is to *Pulvinaria*."

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, A. M., ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 10.—Continued from p. 273.)

Subfamily II.—Emboleminæ.

The globose or rounded head, which is never flat, oblong, and the difference in the antennæ, the antennæ in males being 10-jointed, in the females 13-jointed, readily separate the subfamily from the Bethylinæ. The group comes quite close to the Dryininæ, but in the latter the head is transverse or subquadrate, never rounded, while the antennæ are 10-jointed in both sexes

The genus *Olixon*, Cameron, originally described as a Braconid, belongs here, without much doubt, I think, judging from the description and the figure. Cameron says : "I am unable to point out the natural position of this curious genus. The elongated fore legs give it a look of a Bethylid, to which, indeed, it bears a general resemblance, ; but I feel inclined to regard it as a true Braconid." I have not seen a specimen of this genus, but Mr. Cameron's figure and description clearly show that it belongs here ; the thickened fore femora are characteristic of the group.

Table of Genera.

1. Males : antennæ 10-jointed ..... 4.
   Females : antennæ 13-jointed.
   Wingless or subapterous forms ..... 2.
   Winged forms ..... 3.
2. Scape much shorter than the first joint of the flagellum ; form elongate; head long, oval, wider than the transverse pronotum ; ocelli wanting; eyes prominent, placed high up on the sides of the head and extending forward to hardly half the length of the head ; antennæ long, slender, inserted anteriorly *below* a line drawn from the base of the eyes ; first joint of flagellum the longest. . (1) Olixon, Cameron.
   (Type O. testaceus, Cam.)

   Scape much longer than the first joint of the flagellum ; form less elongate ; head rounded, with a frontal tubercle ; ocelli very minute or wanting ; eyes rounded, not prominent. . (2) Pedinomma, Förster.
   (Type Myrmecomorpha rufescens, Westw.)

3. Eyes arched; ocelli large; scape shorter than the first joint of the flagellum.....(3) Embolemus, Westwood.
(Type E. Ruddii, Westw.)

4. Pronotum shorter than the mesonotum, *without* a median sulcus; scape much shorter than the first joint of the flagellum; stigma in the front wings three or more times longer than thick.....(3) Embolemus, Westwood.

Pronotum as long as the mesonotum, *with* a deep median sulcus; scape much longer than the first joint of the flagellum; stigma in front wings not twice as long as thick.....(4) Ampulicomorpha, Ashmead.
(Type A. confusa, Ashm.)

SUBFAMILY III.—Dryininæ.

This natural group is easily recognized by the antennæ, which are 10-jointed in both sexes, and by the shape of the head, which is quite different in shape from that in the *Bethylinæ* and the *Embolemin*æ.

The species in their habits and development also differ from the others, all of them being parasitic upon the nymphs of various Rhynchota, belonging to the suborder Homoptera, the families Fulgoridæ, Cercopidæ, Membracidæ and Jassidæ being especially subject to their attacks.

Table of Genera.

1. Males.....7.
Females.
Vertex convex, *not* impressed.....3.
Vertex deeply impressed or concave; anterior feet chelate.....2.

2. Wingless, *without* a scutellum.....(1) Gonatopus, Ljungh.
(Type G. pedestris, Ljungh.)
Winged, with a scutellum.....(2) Dryinus, Latreille.
(Type D. formicarius, Latr.)

3. Front wings with an oval or ovate stigma.....4.
Front wings with a narrow or lanceolate stigma; front feet chelate.
Pronotum not quite as long as the mesonotum, much contracted; fourth joint of front tarsi not much longer than the third, the first twice as long as the three following united; maxillary palpi 4-jointed.....(3) Bocchus, Ashmead.
(Type B. flavicollis, Ashm.)

4. Front tarsi not chelate.....6.
Front tarsi chelate.....5.

5. Pronotum almost as long as the mesonotum ; fourth joint of front tarsi much longer than the third; the first *not* or scarcely longer than the three following united ; maxillary palpi 5-jointed..... (5) Chelogynus, Haliday.
(Type C. fuscicornis, Hal.)

Pronotum much shorter than the mesonotum ; fourth joint of front tarsi scarcely longer than the third, the first *not* longer than the three following united ; maxillary palpi 4-jointed..... (6) Anteon, Jurine.
(Type A. jurineanus, Latr.)

6. Pronotum much longer than the mesonotum, the latter *without* a trace of furrows ; head large, broad..... (7) Mystrophorus, Förster.
(Type M. formicæformis, Ruthe.)

Pronotum not or only slightly visible from above ; mesonotum well developed *with* furrows..... (8) Aphelopus, Dalman.
(Type A. melaleucus, Dalm.)

7. Front wings with an oval or ovate stigma..... 8.
Front wings with a narrow or lanceolate stigma.

Occiput deeply concave ; vertex and neck separated by a sharp angle ; mesonotum usually with distinct furrows ; front wings with a discoidal cell ; maxillary palpi 4-jointed..... (1) Gonatopus, Ljungh.
= Labeo, Haliday.

Occiput not deeply concave, straight and broad ; front wings without a discoidal cell ; maxillary palpi 5-jointed..... (4) Phorbas, Ashmead.
(Type P. laticeps, Ashm.

8. Pronotum always much shorter than the mesonotum, sometimes hardly visible from above..... 9.
Pronotum much longer than the mesonotum.

Mesonotum *with* furrows ; maxillary palpi 5-jointed..... (5) Chelogynus, Haliday.
Mesonotum *without* furrows ; maxillary palpi 4-jointed..... (7) Mystrophorus, Forster.

9. Pronotum distinct ; mesonotum with or without a trace of the furrows ; maxillary palpi 4-jointed..... (6) Anteon, Jurine.

Pronotum not or scarcely visible from above, more or less hidden by the front margin of the mesonotum, which is strongly developed, the furrows on the latter distinct; maxillary palpi 5-jointed.....(8) Aphelopus, Dalman.

Family XXXIII.—Trigonalidæ.

This family, on account of its anomalous character, is one of the most interesting in the superfamily Vespoidea. The species are extremely rare, although widely distributed, and only four genera are known.

The family is usually associated with the Evaniidæ and the Ichneumonidæ, in my opinion an unnatural position for it.

Prof. Westwood, however, evidently had a true appreciation of the affinities of his genus *Trigonalys*, the type of the family, for when he described it, in 1835, he observes: "*Genus anomalum familiæ dubiæ caput et antennæ Lydæ, abdomen Mutillæ. Alarum nervi ut in Myrmosa dispositi.*" Again, five years later, in his Introduction Mod. Classif. Insects, Vol. II., p. 215, he wrote: "I may here mention another anomalous genus, which I have described under the name Trigonalys, having somewhat of the aspect of a male Mutilla, but with the head flattened and the antennæ longer, very slender at the tips, and composed of 23 or 24 joints, very like those of Lyda; the legs are simple and the abdomen punctured. The veins of the wings are nearly as in Myrmosa and Mutilla Europæa male."

The responsibility for the removal of Trigonalys to the Terebrant Hymenoptera appears to be due to Shuckard, an able British Hymenopterologist, who, in 1851, deceived by the anomalous character of the antennæ and the two-jointed trochanters, incorrectly associated it with *Aulacus*, Jurine, into a family to which he gave the name *Aulacidæ*, placing the family next to the Evaniidæ.

Mr. Cresson, in his Synopsis of the North American Hymenoptera, published in 1888, properly established the family Trigonalidæ, but has incorrectly placed it between the families Evaniidæ and Ichneumonidæ.

The Trigonalidæ, in my opinion, have nothing to do with the Evaniidæ or the Ichneumonidæ; they are far removed and widely separated by many salient characters, and represent a natural group in the superfamily Vespoidea. Their affinities, to me, seem to be clearly with the Bethylidæ,

Sapygidæ, Myrmosidæ and Mutillidæ; they also agree with the three last-mentioned families in habits, since species of Trigonalys have been bred from the nests of wasps (*Vespa* and *Polistes*). It is probable also that, like the Mutillidæ, they will be found to live parasitically in the nests of some of the bees.

Table of Genera.

1. Second cubital cell triangular or petiolate, the first recurrent nervure not interstitial, joining the cubitus before the first transverse cubitus; anterior margin of clypeus truncate or slightly rounded, never emarginate; second ventral segment in ♂ normal.....2.

   Second cubital cell not petiolate, the first recurrent nervure interstitial with the first transverse cubitus; second recurrent nervure joining the third cubital cell at or a little *before* the middle; anterior margin of clypeus more or less emarginate medially; second ventral segment in ♂ produced at apex medially into a tooth or process .....(1) Lycogaster, Shuckard.
   (Type L. pullatus, Shuck.)

2. Front wings with *three* cubital cells, the marginal cell not attaining the apex of the wing.....3.

   Front wings with *four* cubital cells, the marginal cell attaining the apex of the wing.

      Legs not short, rather slender, not robust, the tarsi slender, the basal joint elongate, joints 2–4 much longer than wide; antennæ more than 16-jointed, tapering off toward tips.....(2) Trigonalys, Westwood.
      (Type T. melanoleucus, Westw.)

      Legs short, robust, the tarsi stout, the first joint hardly thrice as long as thick; joints 2–4 transverse; antennæ 16-jointed.....(3) Nomadina, Westwood.
      (Type N. Smithii, Westw.)

3. Second cubital cell receiving the second recurrent nervure.....(4) Liaba, Cameron.
   (Type L. balteata, Cam.)

THREE NEW SPECIES OF CULEX.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Culex atropalpus, new species.

♀. Black, the halteres, apices of coxæ, and bases and under side of femora, except toward the apex, yellowish white; scales of palpi black, occiput covered with broad, appressed whitish scales and with a patch of black ones near the middle of each side, the middle of the upper side covered with narrow yellowish scales, the upright forked scales yellow; scales of mesonotum golden yellow and with a median vitta of black ones; scales of abdomen purplish black, and with a narrow fascia of whitish ones at the bases of the segments, becoming much broader on the venter; scales of legs black, those at base and on under side of femora, except toward the apex, also at extreme apices of femora, both ends of tibiæ and of the tarsal joints, except the last two and apex of the third on the front and middle tarsi, white, those on last joint of hind tarsi wholly white; claws of front and middle tarsi toothed, those of the hind ones simple; wings hyaline, lateral scales of the veins long and narrow, first submarginal cell slightly over twice as long as its petiole.

♂. Colouring as in the female, except that the short joints of the antennæ are ringed with white; palpi two-thirds as long as the proboscis, slender, the apex blunt, last two joints less than half as long as the remaining portion, and bearing a few rather short hairs; claspers of nearly an equal thickness, evenly covered with hairs, and with a long, slender, curved claw at apex of each; fourth joint of front and middle tarsi as broad as long; larger claw of front and middle tarsi one-toothed, the smaller one and the claws of the hind tarsi simple.

Length, 3.5 to 4.5 mm. Thirty-seven females and three males. Type No. 6558, U. S. National Museum.

Habitat.—Richmond, Va. (Sept. 26: E. G. Williams); Plummer's Isd., Montgomery Co., Md. (May 18 to Aug. 14: R. P. Currie and H. S. Barber); Shenk's Ferry, Pa. (Oct. 21: S. E. Weber), and White Mts., N. H. (H. K. Morrison).

Near *Canadensis*, but readily distinguished by the colour of the scales on the palpi and mesonotum.

Culex varipalpus, new species.

♀. Same as *atropalpus*, with these exceptions: Scales on apices of palpi and a ring near the middle, white; occiput with two patches of

black ones on each side, the upright forked ones black and whitish ; first submarginal cell noticeably less than twice as long as its petiole.

Length, 3 mm. A female specimen collected July 29 by Mr. H. S. Barber. Type No. 6559, U. S. N. M.

Habitat.—Williams, Arizona.

Culex quadrivittatus, new species.

♀. Differs from *atropalpus* as follows : Scales at apices of palpi and several on the upper side white, scales of occiput yellowish and with four patches of black ones ; scales of mesonotum black and with four vittæ, and lateral margin of golden yellow ones ; abdomen black scaled, each segment with a lateral patch of white ones extending nearly to the middle of the venter ; scales of legs at apices of tibiæ and of joints of tarsi black, on the last two joints of the hind tarsi wholly black, tarsal claws simple.

Length, 4.5 mm. Eight females received, June 13, by Dr. L. O. Howard from Prof. Gustav Eisen, of San Francisco, Cal. Type No. 6560, U. S. N. M.

Habitat.—Chacula, Guatemala (6,600 feet altitude).

A NEW MYODITES (RHIPIPHORIDÆ).

BY W. DWIGHT PIERCE, LINCOLN, NEBR.

The specimens on which this description is based are in the collections of the University of Nebraska and of the author. I owe especial acknowledgments to Mr. J. C. Crawford, Jr., for specimens and field observations, and to Professor Bruner for directing my work. A sixteen-power glass was used in determining characters.

Myodites solidaginis, n. sp.—Female : Length, 7.9 mm. Head depressed, finely and evenly punctate, clad with dense yellowish-white, perpendicular pubescence. ; antennæ pectinate, ten-jointed, pubescent, very finely punctate, third joint with base of tooth yellowish ; vertex between antennæ elevated ; mandibles with the exterior side finely punctate, densely pubescent, grooved, in front and on interior sides shining glabrous. Thorax densely punctate, with median groove, but becoming mesially carinate behind the centre, clad with dense, upright, yellowish-white pubescence. Scutellum very finely and densely punctate, pubescent ; postscutellum shining glabrous ; metathorax bilobed, densely pubescent, punctate ; first dorsal segment of abdomen glabrous, remaining dorsal segments punctate, pubescent ; thorax and abdomen below, pygidium and legs punctate, pubescent ; elytra irregularly punctate,

slightly pubescent; posterior tarsi with first joint large, elevated, obliquely truncate and emarginate at tip, more than twice as long as second and much thicker, second joint longer than the third; claws pectinate; anterior and median tibiæ with the first joint longer than the three following joints.

Colour: Antennæ with the exceptions above mentioned, head, thorax, pygidium, genital sheath, femora, first ventral segment, transverse band on the first dorsal and lateral segments, two spots on second ventral, and median spots on the last four dorsal segments, black; abdomen, with the above exceptions, red; elytra honey-yellow; wings transparent honey-yellow, with a large fuscous cloud on the costal margin toward apex; tarsi and tibiæ varying from black to yellow. The ♀ abdomen varies from red to brownish.

Male: Length, 7–9 mm. Similar to the female, with the following exceptions: Antennæ double flabellate, 11-jointed, finely punctate throughout, pale yellow, tipped with dark; abdomen dark, with joints of first three dorsal segments yellowish, membraneous. Legs yellow, with black spot at junction of femora and tibiæ.

This species differs from *Popenoi*, *semiflavus* and *scaber* by having the abdomen red in the ♀ and black in the ♂. From the first two it differs by having the prothorax black, punctate, densely pubescent, vertex pubescent; from *Popenoi* by having the first joint of posterior tarsi more than one-half longer than second; from *scaber* by having the first joint much thicker than the second.

A large series of females was caught by the author on August 24, 25, 26, 1901, and by Mr. Cary on August 26, on flowers of *Solidago Missouriensis*, *rigida* and *Canadensis*, at Lincoln, Nebr. A large number were also taken August 21, 1902, and during the following week. These were, as a general rule, ovipositing in the buds of *Solidago rigida*, while a few were on the flowers of *Solidago Missouriensis*. The distribution was limited to the regions near the salt basins.

A large swarm of males was caught flying in the region of colony of *Epinomia triangulifera*, Vachal, *Perdita albipennis*, and certain species of *Andrena* and *Nomada*, on August 25, 1901, by Mr. Crawford, on the salt basins at Lincoln. Two males were caught on *Solidago* by the author; also two pairs on August 26 and 27, 1901.

A ♂, taken from the Pine Ridge, in Northwestern Nebraska, during July, has the antennæ orange coloured, the clouding of the elytra fulvous, and is slightly smaller. This may be a different species.

TWO NEW SPECIES OF LEPIDOPTERA.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

Peridroma canities, n. sp. — Form and markings of the Texan *P. annexa*, but of a different, dusty gray, colour and a little shorter winged. Primaries dusty gray, with a slight dusky shading along costa, against which the pale dots, marking inception of transverse lines, are relieved. T. p. line tolerably distinct, indentate interspaceally, with included pale shade. Veins marked with fuscous. T. a. line double, with a strong outward inflection above internal margin. Claviform blunt, filled in with fuscous. Orbicular with central dot. Reniform moderate, filled in with fuscous. Cell slightly darker shaded. Markings inconspicuous, concolorous. Hind wings (♀) white.

Received with *P. massium*, Guen., from G. Schimpf, Buenos Ayres. I am indebted to Sir George Hampson for determinations. The present species is unnamed in the British Museum. The thoracic markings are faint; collar dusky, abdomen paler, with faint dorsal shade. According to Tutt, *saucia* is the type of *Peridroma*, Hb. (see Grote, List, etc., 20).

Loxostege triumphalis, n. sp.—Apparently allied to *annaphilalis*, Grote, but a smaller insect (20 mm.), and without the brown spot on primaries and the black line on the orange hind wings (see CAN. ENT., XIII., 34). The species has the same false air of an *Annaphila*, owing to the colours. Fore wings blackish, with a sprinkling of bone-coloured or white scales, somewhat lustrous. Reniform a black cloud. Transverse lines obsolete. A discontinuous series of black antemarginal dots. Fringes blackish, intermixed with whitish scales. Hind wings pure dull orange, with neatly defined blackish fringes, and a blackish shading at base; beneath both wings orange like hind wings above; a black mark on fore wings in place of reniform. Costa of primaries marked with black before apices, which latter show a blackish shading. Body above and appendages black or blackish like primaries, the abdominal segments vaguely defined by scattered pale scales; beneath, with under side of palpi, orbits of the eyes, legs, more or less white or whitish. The clypeal prominence is feeble.

Two male specimens of *L. triumphalis* were sent me from San Luis Obispo, California, by Mr. Geo. Franck. So far as the literature is accessible to me, I find no description of the species. One specimen is unset.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The thirty-ninth annual meeting of the Society was held in London on the 29th and 30th of October. A business meeting of the Council was held during the first morning. In the afternoon a conference on the pea weevil in Ontario took place. Dr. Fletcher gave an account of the spread of this insect and the injury and loss it had caused; the pea crop of this Province he considered to be one of the most valuable products of the country, and yet it was rapidly being reduced by the weevil to such an extent that no less than seventy thousand acres had been withdrawn from this crop during the last ten years, involving an annual loss to the community of about five millions of dollars. The policy of abandoning its cultivation for two or three years was advocated in some quarters, but this he believed to be entirely unnecessary, as there was a cheap, easy and effective remedy available. If the pea-growers would harvest and thresh their crop at as early a date as possible, and then fumigate the stored peas with bisulphide of carbon, there would be no difficulty in getting rid of the pest. The important point is how to prevail upon the farmers to adopt this method of controlling the insect. In the discussion which followed, and which was participated in by Prof. Lochhead, Mr. Fisher, Dr. Bethune, Mr. Pearce, and Prof. James, it was suggested that the Superintendent of the Farmers' Institutes of Ontario should have the matter brought before all the meetings during the coming winter, that information regarding the insect and the remedial measures to be employed should be disseminated as widely as possible, and that the Government of Ontario should be requested to send a competent staff of men to the rural sections of the country, whose duty it should be to show the farmers practically how these remedies can most easily and successfully be carried out. Resolutions in accordance with these suggestions were unanimously adopted.

Mr. George Fisher, the Provincial Inspector of Scale insects, gave a report upon the insects of the year in the Niagara and Hamilton districts, and referred especially to the San José scale. He gave a detailed description of the methods employed in treating fruit trees with the lime and sulphur wash, which he has now proved to be a thoroughly effective remedy for the scale. Dr. Fletcher stated that he had just returned from visiting the scene of Mr. Fisher's operations, and could bear the highest testimony to their complete success. At the close of the discussion, which included the chemical composition of the wash as well as the mode of preparing and applying it, a resolution was adopted congratulating the

Minister of Agriculture for Ontario and his assistants on the excellent results which had been achieved by their efforts, and the important discovery of a practicable and effective remedy for this most destructive insect.

In the evening a public meeting was held at the Normal School, at which Prof. James, Deputy Minister of Agriculture for Ontario, presided. The Rev. Dr. Fyles read his presidential address on "Insect Life," illustrated by a series of beautiful coloured diagrams which he had himself prepared. Prof. Lochhead followed with a lecture on "Some noted Butterfly-hunters and some common Butterflies," which he illustrated with a large series of lantern pictures.

On Thursday, Oct. 30th, the reports of the Council, Directors, Officers, Branches and Sections were read, and also a number of valuable and interesting papers; these will all be published in full in the Annual Report to the Legislature. Many rare and interesting specimens were exhibited, and a considerable numher were kindly presented to the Society's collections. The election of officers resulted as follows:

President — Professor William Lochhead, Ontario Agricultural College, Guelph.

Vice-President—J. D. Evans, C. E., Trenton.

Secretary—W. E. Saunders, London.

Treasurer—J. H. Bowman, London.

Directors: Division No. 1—C. H. Young, Hurdman's Bridge.
Division No. 2—C. E. Grant, Orillia.
Division No. 3—E. M. Walker, Toronto.
Division No. 4—G. E. Fisher, Freeman.
Division No. 5—J. A. Balkwill, London.

Directors Ex-officio (ex-Presidents of the Society)—Professor Wm. Saunders, LL.D., F.R.S.C., F.L.S., Director of the Experimental Farms, Ottawa; Rev. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., London; James Fletcher, LL.D., F.R.S.C., F.L.S., Entomologist and Botanist of the Experimental Farms, Ottawa; W. H. Harrington, F.R.S.C., Ottawa; John Dearness, Normal School, London; Henry H. Lyman, M.A., F.R.G.S., F.E.S., Montreal; Rev. T. W. Fyles, D.C.L., F.L.S., South Quebec.

Librarian and Curator—J. Alston Moffat, London.

Auditors—W. H. Hamilton and S. B. McCready, London.

Editor of the Canadian Entomologist—Rev. Dr. Bethune, London.

Editing Committee—Dr. J. Fletcher, Ottawa; H. H. Lyman, Montreal;

J. D. Evans, Trenton; W. H. Harrington, Ottawa; Professor Lochhead, Guelph.

Delegate to the Royal Society—Rev. Dr. Bethune, London.

Delegates to the Western Fair—J. A. Balkwill and W. E. Saunders, London.

Committee on Field Days—The Chairmen of the Sections and Dr. Woolverton, Messrs. Balkwill, Bowman, Law, Moffat, Rennie, and Saunders, London.

Library and Rooms Committee—Messrs. Balkwill, Bethune, Bowman, Dearness, Moffat, and Saunders, London.

REMARKS ON THE THIRD VOLUME OF TUTT'S BRITISH LEPIDOPTERA.

BY HARRISON G. DYAR, WASHINGTON, D. C.

The third volume of Mr. J. W. Tutt's "A Natural History of the British Lepidoptera," etc., is marked by the same care and fullness of detail as the previous volumes. The detail with which the subject is treated appears in the fact that this volume of 540 pages treats of but 14 species of moths. It is a veritable storehouse of information.

Mr. Tutt has quoted my views on the larval characters in several places, and has raised certain questions in this connection on which I wish to remark.

For some unexplained reason, Mr. Tutt refuses to accept the homology of the primary setæ of the Sphingidæ as being the same as that of other Lepidoptera (pages 233 note, 359, 364 note, 365, 367 and 499). He states that tubercle v is absent, and there is an additional tubercle before the spiracle, which is not v moved up, but something new. I cannot imagine any reason sufficient to account for such a radical supposition. How remarkable such a structure would be Mr. Tutt himself does not seem to appreciate. If it were so, it would almost remove the Sphingidæ from the Lepidoptera; for if there is one thing constant in Lepidopterous larvæ, it is the five upper primary setæ, which are absolutely uniform, not only in the Lepidoptera, but in other allied lower forms, such as the Mecoptera. The number of these setæ may be increased by the addition of secondary ones, and they may be obscured by specializations, but a subtraction from their number may

not occur. In the more generalized larvæ, tubercles iv and v occur side by side, in line, neither one higher than the other. In certain Tineids this position begins to fluctuate, in some iv being a little higher than v, in others v a little higher than iv. In the Bombycid phylum (culminating in Noctuidæ and Arctiidæ), the tendency of iv to be elevated is emphasized, and it rises as high as the top of the spiracle, or even a little above it, on certain segments of some Noctuidæ, while v remains in its original subventral position. Mr. Tutt accepts this interpretation, and does not feel called upon to invent hypothetical setæ to account for the change in position of tubercle iv. Now, in the Sphingidæ the tendency of v to be elevated is emphasized, while iv remains in the original subventral position. The dorsad movement of v in the Sphingidæ is not greater, not so great, in fact, as that of iv in the Bombycid phylum, yet here Mr. Tutt finds a difficulty, and wishes to regard v as absent and represented by a new seta. This seems to me a gratuitous assumption, intrinsically improbable, and contradicted by the very palpable homology of the primary Lepidopterous setæ. Mr. Tutt would homologize "the so-called" tubercle v of the Sphingidæ (page 367) with "the prespiracular wart of the Lachneids." This wart is secondary, as shown by my figure of Tolype (Proc. Bost. Soc. Nat. Hist., XXVII., 144, 1896) and Malacosoma (Psyche, VII., 259, 1895), but it is accompanied by other secondary structures, while the primary tubercles are all accounted for. He can hardly really mean this, as he does not draw the obvious inference of a close relation between the Sphingidæ and Lachneidæ.

Mr. Tutt's references to the Lachneid tubercles are far from clear. He says that in *Pachygastria trifolii* (p. 23), "iv and v form a subspiracular, many-haired wart," and of *Lasiocampa quercus* (p. 60), "iv + v almost postspiracular." This would imply a union of tubercle iv and v, which I have never observed in the Lasiocampid phylum. These tubercles remain separate, but become reduced, while the large lappet is formed from tubercle vi. It is unfortunate that Mr. Tutt did not bring out clearly the complicated but pretty homology of the Lachneid warts. Figures would have been useful here.

Finally, a word on the relationship of *Dimorpha (Endromis)* and *Chelepteryx* (p. 230). My own view is that these forms are nearly related, though I have not the material to prove the point. It is true that the mature larvæ look very unlike, one being a smooth Sphinx, the other a big, hairy Lasiocampid. But these characters are only

special adaptations. In the first stage, *Dimorpha* has many-haired warts, as shown by my figure in Grote's "Die Saturniiden." I have re-examined the material, and have no correction to make to the figure. Tubercle vi is clearly absent, while i to v are converted into warts, ii smaller than i, iv and v nearly in line, iv only a little dorsad. On the thorax there are two warts above the stigmatal wart. I do not find tubercle iib; if present, it must be a small rudiment (the larvæ are very difficult to examine from their opaque black colour). The arrangement suggests the Lachneid phylum, though the subprimary tubercles are strangely absent, but it does not suggest the Lachneidæ nor Liparidæ proper, on account of the presence of but two upper warts on the thorax. It is, however, nearly paralleled by the first stage of *Bombyx mori*, in which the lower of the three thoracic warts (iib) is reduced to a single small hair; but here the subprimary tubercles are present. *Bombyx* also resembles *Dimorpha* in the loss of the tubercles after the first stage and the development of a "caudal horn." Without specimens of *Chelepteryx* larva, and especially of stage I, it is difficult to get far in comparison with *Dimorpha*. Scott's figure shows a big Lachneid-like larva, with proportionately small, many-haired warts. Wart ii appears absent, corresponding with its extreme reduction in *Dimorpha*, but there are two subdorsal warts in line on the thorax, as in the Lachneid phylum, while warts i on joint 12 are separate. The lateral warts are not shown in the figure, but according to the description there is only one wart to represent iv and v, while vi is present. Someone in Australia ought to give us a full account of *Chelepteryx*.

Mr. Tutt (p. 272 note) queries what I intended by the primitive first stage in *Aglia*, stating that it seems specialized to him. Further on (p. 286 note) he says: "We do not agree that *Aglia* has a primitive first stage." By the primitive first stage I mean that condition in which only the primary setæ are present, unmodified, not converted into warts, and without the addition of any secondary setæ. This condition obtains in *Aglia*, therefore it has a primitive first stage. I do not consider in this definition other specializations of the larva, the hypertrophy of the tubercles, etc. They may be present or not. If present, they naturally constitute a specialization, as Mr. Tutt remarks, but I have not regard to these in this connection.

On page 364, Mr. Tutt states that I consider the Sphingids, Notodonts and Lachneids related on larval characters, and he designates

this as an "impossible combination." In this designation he is perfectly right; but I never held the view attributed to me. I pointed out an analogy in the development of a process on the eighth abdominal segment in the larvæ of these families, but I never intended to imply any homology between them, and I do not think that my article, referred to by Mr. Tutt, reads in this way.

THE HYMENOPTEROUS PARASITES OF PHENACOCCUS CAVALLIÆ, CKLL.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

About the first of October, Prof. T. D. A. Cockerell sent me for names several parasites bred by him from a Coccid, *Phenacoccus cavalliæ*, Ckll., collected at Roswell, New Mexico. In the lot were *four* distinct species of Chalcids, two being new, but one of these is a hyperparasite, as follows: (1) *Blepyrus phenacocci*, sp. nov.; (2) *Cheiloneurus dactylopii*, How.; (3) *Signiphora dactylopii*, Ashm.; and (4) *Tetrastichus blepyri*, sp. nov. The new species are described below:

Blepyrus phenacocci, sp. n.—♀. Length, 1.3 to 1.4 mm. Stature and general appearance similar to *B. mexicanus*, How. Aeneous black, the thimble-like punctuation of the head more or less metallic greenish; antennæ, except the pedicel and the club, all tarsi, and the extreme tips of middle and hind tibiæ, honey-yellow; the pedicel is obconical, about thrice as long as thick at apex, brown-black; the funicle is 6-jointed, the joints transverse, gradually widening to the club, the latter being large, stout and black. Wings hyaline, the tegulæ black, the veins dark brown, the marginal vein very short, hardly twice as long as thick, the post-marginal and stigmal veins long, about equal.

♂. Length, 1 mm. Agrees well with the female, except in colour and structure of the antennæ: the antennæ are wholly black, except the scape narrowly at the extreme apex and beneath towards apex, the pedicel being much shorter, only a little longer than thick, while the flagellum is filiform, clothed with a short pubescence, the joints longer than thick.

Type.—Cat. No. 6604, U. S. N. M.

Hab.—New Mexico: Roswell.

Host.—Rhynch.: *Phenacoccus cavalliæ*, Ckll.

Tetrastichus blepyri, sp. nov.— ♀. Length, 0.8 mm. Black, shining, impunctate, except some punctures in the parapsidal furrows; in one specimen the mesonotum is blue-black; the middle grooved line on the mesonotum is nearly obsolete, wanting posteriorly; metanotum smooth, with a median carina; the scape, the extreme apex of the pedicel, the tegulæ, the apices of the femora, and all tibiæ and tarsi, are yellowish white. Wings hyaline, the veins light brown. The abdomen is ovate, depressed, and very little longer than the head and thorax united.

Type.—Cat. No. 6605, U. S. N. M.

Hab.—New Mexico: Roswell.

Host.—Hym.: *Blepyrus phenacocci*.

XANTHOENCYRTUS, gen. nov.

This new genus, on account of the very short marginal vein and the arrangement of the ocelli, comes near to *Psyllæphagus*, Ashm. The two genera may, however, be separated as follows:

Lateral ocelli not close to the eye margin.

Yellow; pedicel more than twice as long as the first funicle joint; all funicle joints wider than long; club rather large, stout.....Xanthoencyrtus, gen. nov.

Aeneous black or metallic; pedicel not twice as long as the first funicle joint; not all the funicle joints wider than long; club neither so large nor so stout.....Psyllæphagus, Ashm.

Xanthoencyrtus nigroclavatus, sp. n.— ♀. Length, 1.6 mm. Yellow; the legs and the sutures of the abdomen yellowish white; eyes and club of antennæ brown-black; scape above more or less, the pedicel basally and the first four joints of the funicle light brownish, the tip of the pedicel and the fifth and sixth funicle joints yellowish white. Wings hyaline, finely pubescent, but with an oblique hairless line from the marginal vein; the marginal and postmarginal veins are punctiform, while the stigmal vein is moderately long, with a slight upward curve.

Type.—Cat. No. 6606, U. S. N. M.

Hab.—Indiana; Princeton (Prof. F. M. Webster).

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SOME NEW BYTHOSCOPIDÆ FROM BRITISH COLUMBIA AND THE SOUTHWEST.

BY E. D. BALL, UTAH AGR. COLLEGE, LOGAN, UTAH.

Every collection of western Bythoscopidæ that the author has examined has had a more or less heterogeneous assemblage of forms closely resembling *Idiocerus alternatus*. These have been somewhat indiscriminately divided between *alternatus*, *ramentosus* and several MS. names of Uhler's in classification, or not determined at all. At the time of publication of the key to this genus,* the material at hand was not sufficient to warrant the descriptions of these forms, and they were omitted. Since then the author has paid special attention to the collecting of this group in Colorado, and has received a long series of specimens from the Pacific Coast, mainly from the collection of Mr. C. Livingstone. With this material it has been possible to accurately define a number of these species and clear up much of the obscurity in this section of the genus. During the progress of this study several other new species and varieties have been described, and are also presented here.

Macropsis bisignata, n. sp.

Size and form of *apicalis* nearly, slightly more elongate, slightly resembling *miscella*, but differently marked. Bright green, the inner half of clavus, the apical cells and all of the membrane testaceous brown. Length: ♀, 5 mm.; ♂, 4 mm. Width, 2 mm.

Head much narrower than posterior angles of pronotum; vertex longer than in *apicalis*, and very slightly angled in front. Face as in *apicalis*, but the front much more inflated; elytra long and rather narrow, heavily clothed with stiff black hairs; Female segment over half longer than the penultimate, the posterior margin rounding, with a small

*Dav. Acad. Nat. Sci. Proc., Vol. VII. p. 124, 1899.

rounding median notch ; whole segment often elevated so as to give it the appearance of being angularly emarginate from the lateral angles. Male valve nearly twice as long as the ultimate segment, posterior margin rounding, disc convex or slightly angularly elevated.

Colour : deep green, the inner two-thirds of clavus from the pronotum back to the middle, where it is abruptly truncate, the membrane and apical cells reddish brown, elytral hairs black.

Described from twenty-four specimens from Holly, Trinidad, Pueblo, Palmer Lake and Fort Collins, Colo.

Pediopsis trivialis, n. sp.

Resembling *viridis*, but larger, as large as *erythrocephala*, but with longer, narrower elytra than in either species. Light green, the male but little darker. Length : ♀, 6 mm.; ♂, 5 mm. Width, 1.5 mm.

Vertex very nearly right angled, slightly more acute than in *erythrocephala*, much more than in *viridis*; pronotum rather narrow, the rugæ fine and distinct ; elytra long and narrow, with long apical cells.

Colour: female entirely light green, no mark on propleura ; male light green, the tips of the elytra often slightly embrowned, the tip of the rostrum an oval spot on the propleura, the apices of the anterior tibiæ and the apical segments of all the tarsi black.

Described from twenty-four specimens from Fort Collins, Lamar and Rocky Ford, Colo. In the key this species would follow *erythrocephala*, to which it is allied in size and shape of vertex. The absence of colour markings in either sex and the unmarked propleura of the female will at once distinguish it, however. The larger size and more sharply-angled vertex will separate it from all the other green forms.

Idiocerus dolosus, n. sp.

Form and general appearance of *crataegi*, slightly broader and darker. Face and pronotum irregularly immaculate with brown. Length, 5–5.5 mm.; width, 1.8 mm.

Head as broad as in *crataegi*, much broader than in the other deep-headed species. Vertex not as much curved as in *crataegi*, longest against the eyes. Face very deep and straight, front full and rounding as in *Provancheri*; clypeus short, constricted in the middle and much widened just at the apex ; elytra similar to those of *crataegi*, inclined to be more flaring, giving the insect a more robust appearance ; venation somewhat obscure, three anteapical cells, the outer one short. Female segment shorter than in *crataegi*, the posterior margin broadly rounding,

with a shallow median notch. Male valve transverse, the posterior margin but little rounding, slightly longer than the ultimate segment.

Colour: vertex and face pale yellow, two large angular black spots on the vertex, about their own width from the eyes and almost touching the hind margin; rest of surface irregularly maculate with large brownish fuscous spots, usually a pair between the black spots and another pair below them, the lateral sutures of front and clypeus from antennæ down, including all of apical half of clypeus, except a narrow median line, deep black; pronotum pale, irregularly marked with brownish fuscous, omitting a median line expanded in front; scutellum pale, with a pair of black triangles within the lateral angles, and a pair of spots on disc; elytra smoky brown, the nervures and margins back to the apical cells light.

Described from twenty-four examples from Dolores, Colorado Springs and Fort Collins, Colo.; all from within the mountains. This is a distinct and well-marked species, allied to *crataegi*, but at once distinguished by the more complex venation and large number of spots, as well as the black "Y" of the face.

Idiocerus formosus, n. sp.

Smaller and narrower than *lachrymalis*, resembling the European *populi* in size and form, but more heavily marked. Length: ♀, 6 mm.; ♂, 5.25 mm. Width, 1.8 mm.

Vertex long, but little curved; face almost flat, front broad below, but not expanded as much as usual at the antennæ; elytral nervures non-tuberculate, outer apical nervure curving away to costa without forming an anteapical cell, or, at most, a short triangular one. Female segment short, transverse, the middle third produced into a rounded lobe nearly twice as long as the rest of the segment; pygofers moderately long, much inflated, exceeded by the ovipositor by about twice its width. Male valve trisinuate; antennal discs large, about twice longer than wide.

Colour: vertex and face pale greenish yellow, a pair of round black spots on the vertex and a pair of elongate spots against the eye, both pairs of spots connected on their lower margins by a transverse black band; another pair of black spots within and beneath the ocelli, on the front. The black band and spots on the front are sometimes absent in the male. Pronotum grayish or greenish, with irregular fuscous markings on the anterior third; scutellum pale yellow or greenish, usually with the basal angles and a pair of round spots on disc fuscous; elytra varying from

tawny to dark brown, usually iridescent, the apices of the claval nervures and an irregular oblique band back of the clavus milky white. Sometimes there is more or less of milky white between the dark nervures on the base of the corium.

Described from twenty-four specimens from Happy Hollow, Ward, North Park, Salida and Rico, Colo. The face and pronotal markings are similar to *lachrymalis*, while the elytra, especially in the male, are quite different. It should follow that species in the key, from which the small size and long antennal discs will readily separate it.

Idiocerus concinnus, n. sp.

Size and general appearance of *brunneus*, more highly coloured, resembling *rufus*, but larger, broader, and with antennal discs. Length, 5.5 mm.; width, 1.75 mm.

Vertex and face moderately broad, much less inflated than in *brunneus*, margins of genæ but slightly rounding; elytra nearly opaque, the venation indistinct; nervures with setigerous punctures; outer anteapical cell present, rather long. Female segment almost twice the length of the penultimate; posterior margin slightly rounded, often slightly sinuate; pygofers stout, moderately long, twice longer than in *brunneus*, nearly half longer than in *amabilis*, the ovipositor exceeding them by its own width. Male valve with a blunt median tooth, distinctly exceeded by the strong lateral angles; antennal plates large, oval.

Colour: Female pale cinnamon brown, the pronotum darker; face and all below yellow. Male darker, especially along the dorsum of elytra, where the dark tergum shows through. Face and below pale yellow, with faint stripes beneath the eyes.

Described from numerous specimens from Vancouver Island, B. C. (Livingstone). This has been received as *rufus*, G. and B., but it is quite distinct. The discs of the male antennæ alone would readily distinguish them. It more closely resembles *brunneus*, from which the third anteapical cell and the distinct genitalia, as well as the absence of spots on vertex, will readily separate it.

Idiocerus amabilis, n. sp.

Resembling *amoenus* in form and general appearance, but much stouter and more highly coloured. Pale fulvous brown, with light markings along the median line, and greenish margins to the elytra. Length, 6 mm.; width, 2 mm.

Vertex and face broad and flat; nervures of elytra tuberculate; outer anteapical cell short, the outer nervures often faintly outlined. Female segment half longer than penultimate, very slightly produced on middle half; pygofers short and very stout, but little exceeded by the ovipositor. Male valve transverse, excavated either side of a median tooth. Antennæ with rather large discs, nearly twice longer than wide, and tapering at both ends.

Colour: vertex and upper part of face, down to ocelli, in female, fulvous brown, omitting a median line above, pale creamy below. Male: face creamy, washed with fulvous above and usually greenish below, a brown stripe beneath each eye and usually one on the front. Pronotum fulvous brown, a median stripe and a round spot in the middle of either side white; scutellum fulvous, darker near the basal angles, a definite spot near the apex, and often a pair of irregular ones on the disc; elytra brownish fulvous, shading to greenish on the costa, the sutural margins fuscous, interrupted by a common white spot on the apices of the outer claval nervures and an obscure white band just back of clavus, usually evident on the first two nervures of corium.

Described from twenty-four specimens from Vancouver Island, B. C. (Livingstone), North Park, Home, Gunnison and Salida, Colo.

Idiocerus femoratus, n. sp.

Resembling *alternatus*, larger and darker; female with a shorter ovipositor and a longer segment, male with the middle femora greatly inflated, more than five times as large as the anterior ones. Length, 6 mm; width, 2 mm.

Head very broad; vertex distinctly curved, sometimes slightly angled in front; face nearly flat, strongly retreating; venation as in *alternatus*, the outer anteapical cell long and parallel margined. Female segment much longer than in *alternatus*, parallel margined or slightly rounding posteriorly, ovipositor exceeding the moderately-long pygofers by about twice its width. Male antennæ with small oval discs on long setæ. Intermediate femora in male from five to ten times as large as the anterior ones, over half as wide as long.

Colour: vertex with a pair of rather large round spots, usually obscured by a band of irregular fuscous irrorations that extend down to the face; lower part of face with a few brown irrorations in female, usually traces of four brown stripes in male; pronotum irregularly brownish and milky white, with a few black spots on the anterior

submargin ; scutellum with the basal angles, a median line and two discal dots fuscous ; elytra smoky subhyaline, the nervures darker, interrupted with light ; legs light, all the femora and tibiæ lineate with fuscous on the outer (upper) faces.

Described from twenty-four examples from the mountains west of Fort Collins, Ward, Palmer Lake, Marshall Pass and Lizard Head, Colo. The larger size and darker face will distinguish the female of this species from *alternatus* ; the enlarged femora render the male quite distinct in the genus.

Idiocerus ensiger, n. sp.

Size and form of *alternatus* nearly, slightly longer, but with a remarkably long ovipositor in the female. Colour pale chestnut and white. Length, 5.25 mm.; width, 1.8 mm.

Face moderately convex, retreating from the narrow vertex, front short, broad, sharply angulate at antennæ ; elytra with a moderately long outer anteapical cell. Female segment moderately long, transverse, the posterior margin straight ; ovipositor as long as the rest of the body, exceeding the long pygofers by more than one-third, sometimes almost half, of its length.

Colour : vertex and face pale chestnut, a pair of small spots on vertex and the ocelli dark ; pronotum and scutellum chestnut, the basal angles of the latter sometimes dark ; elytra subhyaline, with a pale cinnamon-brown reflection, a few of the nervures darkened and usually a light stripe along the suture, which may be emphasized as a pair of spots or continued as a stripe on the pronotum.

Described from nine females taken at Home and Dutch Georges, both mountain places on the Poudre River, Colo. Very few species of *Idiocerus* are sufficiently distinct to be described from one sex alone, especially the female, but the remarkable sword-like ovipositor of this species would seem to warrant that distinction.

Idiocerus musteus, n. sp.

Form and structure of *femoratus*, but smaller. Dull cinereous, clouded with pale olive and brown, a pair of spots on the vertex and usually a few marks on pronotum and scutellum. Length, 5 mm.; width, 1.8 mm.

Face but slightly convex, very deep, margins of genæ straight or slightly emarginate, not angled ; elytra long, narrow at apex ; nervures with setigerous punctures ; outer anteapical cell long and narrow. Female

segment long, broadly rounding posteriorly; pygofers moderately long, much inflated, the ovipositor exceeding them by about twice its width. Male antennæ with very slight black-marked enlargements some distance from the apex.

Colour: face pale yellow, a pair of round black spots on vertex, and sometimes a cloud of olive brown between them; pronotum olive and cinereous, with about six small black spots on the middle half; scutellum pale yellow, with its basal angles and a pair of spots on disc brown or black; elytra pale subhyaline olive brown, the tips of the outer claval nervures and sometimes a spot on the inner sector of corium just beyond apex of clavus milky white; legs and below pale.

Described from twenty-four specimens from Vancouver Island, B. C. These, together with the specimens of *concinnus* and *amabilis*, were part of a nice lot of Jassids sent me several years ago by Mr. Livingstone.

Idiocerus verrucosus, n. sp.

Form and general appearance of *brunneus*, but much smaller, with a long anteapical cell and simple antennæ. Pale cinnamon brown, with heavy dark markings on vertex and front. Length, 4.25 mm.; width, 1.5 mm.

Face broad and very deep, not retreating until nearly the middle of front, sides of genæ perfectly straight; pronotum very short and broad; elytra with the nervures heavily tuberculate, the outer anteapical cell long and narrow. Female segment long, slightly rounding posteriorly; pygofers moderately long and stout, much longer and stouter than in *brunneus*, exceeded by the ovipositor by about twice its width. Male valve long, but feebly excavated each side the middle. Male antennæ with a very fine filament.

Colour: pale cinnamon brown, tinged with fuscous in the male; vertex and face down to antennæ with a dark brown or fuscous band, the black spots on vertex surrounded by light circles, and the ocelli in the inner ends of transverse light dashes. In light examples this band may be wanting or only present as a pair of black marks against the eyes. Pronotum and scutellum marked as in *musteus*.

Described from nine specimens from Dutch Georges and Ward, Colo.

Idiocerus morosus, n. sp.

Form and general appearance of *alternatus* nearly, but smaller, darker, and with a deeper head; structure of *verrucosus* nearly.

Male antennæ with large, nearly circular plates. Length, 4.25 mm.; width, 1.4 mm.

Head much deeper than in *alternatus*, nearly perpendicular down to the antennæ in the female, sloping in the male; venation as in *alternatus*. Female segment slightly rounding posteriorly; pygofers long and slender, exceeded by the ovipositor by two and one-half times its width. Male antennæ with large oval or nearly round discs, about twice as large as in *alternatus*.

Colour: vertex and face pale creamy, a pair of large round spots on vertex; face in the female irregularly mottled with rust brown or fuscous, omitting a pair of circles around the spots on vertex, a pair of oblique spots just outside the ocelli, and a broad stripe down the front. Male face with a pair of crescentiform fuscous dashes outside the spots on vertex, a pair of narrow brown lines down the front, a wider pair on the sutures, and a still wider pair outside; the outer pair and sometimes the middle ones fuscous. Dorsal markings as in *alternatus*, usually somewhat darker in the male.

Described from twenty-four specimens from Alder, Fort Collins, Colo., and the mountains west of the latter place up to 8,500 feet. The small size, deep head and attenuate ovipositor readily separate this from *alternatus*. The antennal plates alone will distinguish it from *verrucosus*, to which in head characters and colour pattern it is closely allied.

Idiocerus obstinatus, n. sp.

Resembling *dolosus* in form and colour, but smaller. Size of *verrucosus* nearly, but with broader elytra. Length, 4.5 mm.; width, 1.5 mm.

Vertex shortest in the middle; face sloping, but slightly convex; elytra inclined to be flaring, narrowing before apex; outer anteapical cell long and narrow. Male valve short and strongly trisinuate; antennæ with a moderate-sized oval disc.

Colour: vertex and face creamy yellow, a pair of very small round spots on vertex, a pair of brown dashes outside of these, a median stripe down face, fuscous in the middle and constricted above the ocelli, and a pair of shining black stripes beneath the eyes; pronotum washed with very pale brown, a few irregular spots in front; scutellum pale, with the angles and a pair of spots on the disc brown; elytra milky subhyaline, the nervures heavily fuscous, omitting the base, the costal margins,

a transverse band back of clavus and a few spots on disc; legs and beneath pale.

Described from two males from Arizona. This is a very distinct form, resembling *crataegi* and *dolosus* in colour marking, but belonging to the *alternatus* group in structural characters.

Idiocerus suturalis, Fitch.

This is either a very variable species in colour markings, and somewhat so in structural characters, or else two or more specific types are commonly referred to under this name. In the material before me there are four forms represented, all agreeing in general form and size, but possessing slight structural differences, and marked coloration characters. In general these forms have not been found associated in such a way as to indicate specific identity, but, on the other hand, in no case has the life-history been sufficiently worked out or enough specimens collected to enable one to accurately define specific limits, and it has been thought best to characterize them, for the present at least, as varieties.

Variety *suturalis*, Fitch (typical form).

The typical form is of a yellowish-green colour, becoming lighter towards the margin, with the basal angles of the scutellum and the scutellar and sutural margins of elytra included in a confluent stripe of a rich brown. This stripe narrows down at apex of clavus and then widens and gives way to a smoky area on the membrane. The outer anteapical cell is usually present in this form, and the antennal disc of the male is moderately large, oval, and about half longer than wide.

This form was described from N. Y., and is at hand from various points in the mountains of Colo., and has been examined from N. Mex. The other references to this species either refer to this form or the next.

Variety *lunaris*, n. var.

Size and form of typical *suturalis*, the outer anteapical cell wanting or rarely present as a small triangle in the apex of the costal nervure. Male antennæ with the filament slightly swollen on the apical half and dark coloured, scarcely to be called a disc.

Colour: pale green, a dorsal stripe wider than in *suturalis*, covering the entire scutellum and extending forward to the posterior margin of pronotum, deep fuscous. This stripe is interrupted on the middle of the clavus by a broad, light crescent, and marked at the apex by a line.

Described from twenty-four examples from Palmer Lake and Fort Collins, Colo., and Beula, N. Mex. This form has also been examined in the past from N. Y.

Variety *continuus*, n. var.

Somewhat stouter than *lunaris*, the outer anteapical rarely present as in that form, and the antennæ in male dark, but scarcely swollen apically.

Colour: pale green or yellowish green, the dorsal stripe even broader than in *lunaris*, covering the whole disc of the pronotum and extending forward nearly to the margin on the median line, black or very dark brown. This stripe is as wide as the scutellum, and is constricted at apex of clavus, beyond which it is smoky.

Described from twenty-four specimens from Ward, Antonito, Estes Park and Rico, Colo.

Variety *vagus*, n. var.

Slightly larger than *suturalis*, even broader than *continuus*, especially in the female, outer anteapical cell rarely present. Male antennæ with a disc similar to *suturalis*, but rounder. Female ovipositor exceeding the pygofers by three or four times its width.

Colour: female pale green, the scutellum with a pair of large dark spots within the basal angles, tergum with the disc dark; elytra subhyaline, the apical nervures dark, and the dark tergum showing through. Male with the dark nervures and scutellar spots as in the female, the elytra and sometimes the posterior part of the pronotum irregularly clouded with fuscous or smoky brown.

Described from eleven examples from North Park and several males from Alder, Home, Rist Canon and Palmer Lake, Colo. The females of this form are quite distinct, but the males sometimes approach *continuus* in colour, but they never have the stripe definitely margined as in that form, and the antennal disc is quite different.

Idiocerus rufus, var. *cingulatus*, n. var.

Size and form of *rufus* nearly, the elytra slightly longer and narrower, giving the insect, especially the females, much more of a wedge-shaped appearance.

Colour: female, face and vertex pale yellow, with rufous markings; pronotum rufous, a median line, a few submarginal spots and a pair of larger ones on the disc, white; elytra rufous, subhyaline, with two transverse light bands often obscure, but marked by the white nervures,

the anterior band crossing the cross-nervure between the sectors. Male brownish fuscous, the face light, often with a pair of spots on vertex. The submarginal spots on pronotum are united into a median crescent, and the elytra are brownish fuscous, with two broad light bands.

Described from twenty-four specimens from Fort Collins and Buena Vista, Colo. This form has been confused many times with *alternatus* and its allies, but the short ovipositor and the bright rufous pygofers in the female and the broad plates and simple antennæ in the male will readily distinguish it.

Idiocerus amoenus, var. *depictus*, n. var.

Size and form of the species nearly, female ovipositor longer and narrower. Male antennal plates slightly smaller.

Colour: female rich creamy yellow; eyes rufous; pronotum, scutellum and narrow scutellar margin to elytra testaceous brown, the colour deepening as you pass back from the vertex, a trace of testaceous on the sutural margin before the apex of clavus. Male pale creamy yellow; basal angles of scutellum, scutellar margins of elytra, a spot before apex of clavus and the apical nervures testaceous. Whole apex of elytra smoky.

Described from two females and one male from Alameda Co., Calif. Collected by E. M. Ehrhorn. This neat little form is remarkably distinct in colour, but the structural characters are not of sufficient value to separate it from *amoenus* on the small amount of material on hand.

NOTES.

Mr. E. Dwight Sanderson, Entomologist of the Delaware Agricultural Experiment Station, Newark, Del., has been appointed Professor of Entomology at the Agricultural and Mechanical College of Texas. His address is now College Station, Brazos Co., Texas.

Prof. Elmer D. Ball, M. Sc., of the Department of Zoology and Entomology in the State Agricultural College, Fort Collins, Colorado, has been elected to the chair of Animal Biology in the Utah Agricultural College, Logan, Utah.

CALLOSAMIA ANGULIFERA.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

Through the great kindness of a friend, I have received cocoons of *Callosamia angulifera*. These are stemless, and at once distinguishable from those of *C. promethea*. This character bears out the theory (see CAN. ENT. for April, p. 94) that *C. angulifera* is the older, more generalized form in the genus. In my work on the Saturnians, June, 1896, I tried to show that the stemmed cocoons of *Philosamia*, *Attacus* and *C. promethea* were specializations and a more modern development, and gave probable reasons for the acquirement of the habit of fixing the cocoon to the branches, so that it might not fall with the leaf in the autumn (l. c., pp. 15–16; also Plate I.). I have shown that, in a general way, the specialization of the Attacid cocoon keeps pace with the specialization of the imago in the whole group. But these specializations do not move exactly together, and the independence of the different stages in this respect is decidedly indicated. In the case of *C. promethea*, the male has evidently more recently become black, while the cocoon has added the stem wanting in the supposed primitive form: *C. angulifera*. But *Samia* shows no disposition in this direction, and yet the imago must be considered more specialized as compared with *Callosamia*. The specializations are unequal throughout, not only as between the different stages of larva, chrysalis and perfect insect, but development is hastened or retarded in different parts or organs in the same stage. Until this is appreciated, judgment will constantly be at fault in classifying these insects. The characters upon which genera are founded are those of comparative specialization.

In the passage of *Samia* to *Rothschildia*, the tendency to form a stem to the cocoon becomes apparent, evidently controlled by the nature of the food-plant. I have suggested (l. c) that this habit of fixing the cocoon to the tree by an artificial stem spun round the leaf and fastened to the twig above, is correlated with the increase of the wings in surface dimension. My studies on the species of *Samia* are not concluded. So far it appears not improbable that the Eastern forms, *Columbia*, *Gloveri*, *Cecropia*, are developments of the Western *Californica* (*Ceanothi*).

TWO NEW MEALY-BUGS FROM NEW MEXICO.

BY T. D. A. COCKERELL.

Phenacoccus cevalliæ, n. sp.

♀. Oval, 4 to 5 mm. long, pale olive green, but covered with white secretion, with lateral tassels and thick caudal tassels; placed in alcohol, they stain the liquid pale green: alcoholic specimens appear strongly segmented, with two longitudinal blackish bands, best marked in rather immature specimens. Eyes prominent; skin with many small circular glands; the lateral patches consist of about twelve glands each, but are without spines; a few rather large bristles scattered about the body; legs and antennæ reddish-yellow; denticle on inner side of claw rudimentary, just visible; antennæ 9-jointed, the club 2-jointed. Measurements of antennæ and legs in μ: Anterior legs, femur and trochanter 470, tibia 330, tarsus 130; hind legs, femur and trochanter 540, tibia 440, tarsus 135. Antennal joints: (1.) 45–60, (2.) 108–111, (3.) 63–66, (4.) 60, (5.) 72–75, (6.) 51, (7.) 51, (8.) 45, (9) 67.

Newly-hatched larva very pale lemon-yellow, about twice as long as broad; eyes conspicuous.

Hab.—In enormous numbers on *Cevallia sinuata*, near Lea Lake, east of Roswell, N. M., Aug. 21, 1902. Much preyed upon by Coccinellids *(Hyperaspis)* and Chalcidids. It is allied to *P. solenopsis*, but from its large size and abundant secretion, it looks like a *Ceroputo*. Professor Tinsley was with me when the species was discovered, and we both thought it a relative of *C. yuccæ*.

Pseudococcus Neomexicanus (Tinsley), var. *alkalinus*, n. var.

♀. About 2½ mm. long and 1¼ broad, covered with mealy-white secretion, with short, thick, cottony caudal tassels, and lateral tassels posteriorly; secreting a thin but dense white sac, which covers all but the hind end of the insect. These sacs are often irregularly stained with bright yellow. ♀ (after boiling in water and mounting in oil of cloves) bright orange; antennæ and legs light yellowish-brown; no produced caudal tubercles; labium 120 μ long and about 78 broad; eyes prominent; caudal bristles about 75 μ long; bristles of anal ring about 66 μ; legs quite stout, breadth of anterior tibia 36 μ; claw with no denticle on inner side; claw digitules very slender; no distinctly knobbed tarsal digitules; antennæ 8-jointed. Measurements of legs and antennæ in μ: Anterior legs, femur and trochanter 210, tibia 135, tarsus 69; hind legs, femur and trochanter 231, tibia 174, tarsus 78. Antennal segments: (1.) 45–54, (2.) 48–54, (3.) 36–41, (4.) 24–30, (5.) 24, (6.) 22–24, (7.) 24–25, (8.) 66–78.

Eggs red; eggs in body of ♀ contained well-developed larvæ, and are about 336 μ long and 180 broad.

Hab.—Roswell, N. M., on a low grass in an alkaline spot, abundant on the leaves and stems, Aug. 24, 1902. I believe this is a distinct species, but it is so close to *P. Neomexicanus (Dactylopius Kingii Neomexicanus*, Tinsley, 1898) that no harm will be done by treating it as a variety for the present. It has a Chalcidid parasite, a species with very pale legs, and the apical portion of the antennæ white, the basal part black.

Two other species allied to the present one are *Pseudococcus roseotinctus (Dactylopius roseotinctus*, T. & W. Ckll.) and *P. salinus (D. salinus*, Ckll.). All these form a little group with a characteristic type of antenna, different from that of the Eastern mealy-bugs.

NOTES ON SOME GENERIC NAMES EMPLOYED BY SERVILLE, IN THE REVUE METHODIQUE, AND FIEBER, IN THE SYNOPSIS DU EUROPAISCHEN ORTHOPTERAN.

BY JAMES A. G. REHN, PHILADELPHIA, PA.

As has been shown by several previous writers, the Synopsis published in instalments by Fieber, in Lotos, Volume III., all appeared on or before August, 1853. Such being the case, all his new generic names have precedence over those of L. H. Fischer,* the preface of whose work bears the date, November, 1853, and which is unlikely to have appeared before 1854.

FORFICULIDÆ.

CHELIDOURA, Serville. Ann. Sci. Nat., XXII., p. 36, 1831.

Usually quoted in the corrected form used by Burmeister—*Chelidura.*

BLATTIDÆ.

PERISPHÆRUS, Serville. Ibid., p 44.

Usually quoted as *Perisphæria*, an emendation.

MANTIDÆ.

BLEPHARIS, Serville. Ibid., p. 47.

As this name is preoccupied by *Blepharis*, Cuvier (Regn. Anim., II., p. 322, 1817), I propose *Blepharopsis* in its place.

*Orthoptera Europaea, Lipsiæ.

PHASMIDÆ.

CYPHOCRANA, Serville. Ibid., p. 60.
Usually quoted as *Cyphocrania.*

ACRIDIDÆ.

CALEPHORUS, Fieber. Lotos, III., p. 97, May, 1853.
Antedates *Oxycoryphus*, Fischer (Orthopt. Europ., p. 311).

CHORTHIPPUS, Fieber. Ibid., p. 100, May, 1853.
Antedates *Stenobothrus*, Fischer (Ibid., p. 313).

DOCIOSTAURUS, Fieber. Ibid., p. 118, June, 1853.
Antedates *Stauronotus*, Fischer (Ibid., p. 351).

AIOLOPUS, Fieber. Ibid., p. 100, May, 1853.
Antedates *Epacromia*, Fischer (Ibid., p. 360).

PŒKILOCERUS, Serville. Ann. Sci. Nat., XXII., p. 275, 1831.
Usually quoted as *Pœcilocerus.*

PRIONOTROPIS, Fieber. Lotos, III., p. 127, June, 1853.
Antedates *Cuculligera*, Fischer (Orthopt. Europ., p. 390).

PELECYCLUS, Fieber. Ibid., p. 119, June, 1853.
Antedates *Platyphyma*, Fischer (Ibid., p. 373).*

OPSHOMALA, Serville. Ann. Sci. Nat., p. 267, 1831.
Usually quoted as *Opsomala* or *Opomala.*

CALLIPTAMUS, Serville (Ibid., p. 284).
Usually quoted as *Calliptenus* or *Caloptenus.*

EYPREPOCNEMIS, Fieber. Lotos, III., p. 98, May, 1853.
Usually quoted in the emended form, *Euprepocnemis.*

TETTIGONIDÆ.

POLYSARCUS, Fieber. Ibid., p. 174, August, 1853.
Antedates *Orphania*, Fischer (Orthopt. Europ., p. 222).

XIPHIDION, Serville. Ann. Sci. Nat., XXII., p. 159, 1831.
Usually quoted as *Xiphidium.*

*Scudder (Proc. U. S. Nat. Mus., XX., p. 96), in treating the name *Podisma*, Latreille, came to the conclusion that *Pezotettix*, Burmeister, should replace *Platyphyma*, Fischer. As there set forth, *Podisma* possessed two originally-included species, which two, "and these only," were the species on which Burmeister's genus *Pezotettix* was founded. In such cases the golden rule, "once a synonym, always a synonym," should be applied, and *Pezotettix* should be relegated to its true position as a synonym of *Podisma*, subsequent restriction having no validity where originally included species are identical.

THE BEE GENUS *DIALICTUS.*

BY J. C. CRAWFORD, JR., WEST POINT, NEBR.

Table for the separation of the species:

Black ..... *lustrans*, Ckll.
Greenish or bluish.
Tegulæ dark.
Bluish; abdomen with metallic lustre; face narrow.. *Theodori*, n. sp.
Greenish; abdomen without metallic reflections; face broader ..... *occidentalis*. n. n. for *anomalus*. Ckll. (non Robt.).
Tegulæ testaceous ..... *anomalus*, Robt.

D. anomalus, Robt. Specimens from Dr. Graenicher, collected at Milwaukee, were examined.

D. occidentalis, n. n. for *D. anomalus*, Ckll.

Ann. and Mag. Nat. Hist., Ser. 7, VII, 126 (Jan., 1901).

This differs from the true *anomalus* in its larger size, more densely punctured mesothorax, finer and more numerous lines on the metathorax, dark tegulæ, abdomen distinctly punctured, quite closely on the second segment; denser pubescence on the abdomen nearly concealing the surface on the apical segments; apical margins of abdominal segments testaceous.

D. Theodori, n. sp.—♀. Head and thorax blue, face closely and rather coarsely punctured and with sparse white pubescence; antennæ dark; flagellum obscurely ferruginous beneath toward apex; mesothorax rather sparsely and finely punctured and finely tessellate; metathorax rugose on base, rugæ not reaching apex; tegulæ dark; wings hyaline, nervures yellowish; legs dark, apical joints of tarsi ferruginous; inner spur of hind tibiæ with 4 long teeth; pubescence of legs white; abdomen black, thinly clothed with white pubescence, more dense apically, and with metallic reflections; apical margins of segments testaceous.

Type.—One specimen (Las Vegas, N. M., May 29, 1902), on *Convolvulus incanus*. Miss Pearl Hitchcock, coll.

Dedicated to Prof. Cockerell, from whom it was received.

NEW SPECIES OF SEMIOSCOPIS.

BY HARRISON G. DYAR, WASHINGTON, D. C.

The following species of *Semioscopis (Epigraphia)* seem undescribed. They were sent for names by Messrs. F. A. and H. D. Merrick, of New Brighton, Pennsylvania, and have been donated by them to the National Museum. These new species closely resemble several of the European ones, yet seem all specifically separable.

Synopsis of North American species of Semioscopis.

Wings sharply trigonate, apex pointed, costa straight.
  Discal mark a curved bar.
    Discal mark continued to base of wing by a long, bent black bar..... *Packardella.*
    This bar sharply abbreviated at one-third from base.. ..*Merriccella.*
    This bar broken into rods and dots, obscurely reaching base..... *aurorella.*
  Discal mark not produced toward base in a bar ..... *megamicrella.*
  Discal mark a pair of superposed dots..... *inornata.*
Wings not trigonate, costa arched at base as in *Depressaria*. ..*Allenella.*

S. Packardella, Clem. *(eruditella*, Grt.).

Two specimens from Michigan (C. P. Gillette) are in the National Museum.

S. Merriccella, n. sp.

Palpi blackish, second joint whitish at base and tip, third joint whitish, a black spot outwardly at base and black ring before tip ; thorax gray, abdomen sordid ochreous. Fore wings light shining gray, slightly shaded with brown, darkly so beyond end of cell and on costa before apex, irrorated rather uniformly with blackish. A large, curved, black bar in the cell, reversed as to curvature with the discal mark ; a row of irregular terminal black spots between the veins. Hind wings and under side silky gray, fringes paler. Expanse 27 to 31 mm.

Two specimens, New Brighton, Pa. (H. D. Merrick), March 15 and 22, 1902.

U. S. Nat. Mus., type No. 6609.

S. aurorella, n. sp.

Palpi essentially as in the preceding. Wings silky gray, fore wings roseate tinged, the basal two-thirds of costa broadly and top of head more

whitish. Wing finely irrorated with black; a curved discal streak, two superposed dashes in the cell, a basal subcostal dash and one from base below median vein to opposite middle of cell, black; three triangularly placed short dashes before apex, an ill-defined subterminal and a terminal row of intravenular black dots. Fringes pale, slightly roseate. Expanse 25 to 30 mm.

Four specimens, New Brighton, Pa. (H. D. Merrick), March 20, 21 and 27, 1902.

U. S. Nat. Mus., type No. 6610.

S. megamicrella, n. sp.

Palpi as in the preceding. Fore wings whitish gray, slightly shaded with fuscous, especially beyond end of cell and with scattered brown scales; fine black scales along costal edge and a shaded spot above discal mark, which is curved and black, in one of the specimens (on one side only), broken into a pair of dots; two superposed dots before middle of cell; three subapical dots in a triangle continued as a submarginal row; a terminal row of dots. Hind wings silky gray, fringe pale. Expanse 18 to 25 mm.

Eight specimens, New Brighton, Pa. (H. D. Merrick), March 7, 10, 20, 21 and 24, 1902.

U. S. Nat. Mus., type No. 6611.

The smaller specimens were sent by Mr. Merrick under a different number, but, though the markings are somewhat confused and the colour a little darker, I do not find them specifically distinct.

S. inornata, Wals.

This is possibly only a varietal form of the preceding, but none of my specimens (of *megamicrella)* are anywhere nearly so large, while the discal mark is a curved streak except on one wing of a small specimen, where it is resolved into dots. There are no specimens of *inornata* in the National Museum.

S. Allenella, Wals.

This species looks like a *Depressaria* in its wing shape and markings. The National Museum has an old specimen, determined by Lord Walsingham and labelled "oak, Aug. 11, 1884"; also from New Brighton, Pa. (H. D. Merrick), May 12 and 22, 1902, and Centre Harbor, N. H. (H. G. Dyar), July 22, 1902.

SOME NEW OR LITTLE-KNOWN BEES.—IV.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

ANTHEMURGUS, gn. nov.

Glossa lanceolate, shorter than mentum; paraglossæ reaching to joint 4 of labial palpi; maxillary palpi six-jointed, longer than lamina, joints short; labial palpi with joints subequal, first one robust; marginal cell about as long as first discoidal, obliquely truncate, appendiculate; cubital cells equal, second receiving the first recurrent nervure about one-third from base and the second near apex; facial foveæ present in both sexes; tibial scopa of female thin, with rather long simple hairs.

A. passifloræ, sp. nov.—♀. Black, shining; head coarsely punctured; mesonotum closely and finely punctured, also with some scattered coarser punctures, trisulcate anteriorly; metathorax with the disc rather finely reticulated, the sides finely punctured; abdomen with apical margins of segments 1–4 shining, impunctate, segment 1 sparsely, 2–5 more closely, punctured; labrum with shining space broader at base and apex; mandibles rufous; apical half of wings clouded; middle metatarsus broader than hind one; middle spur finely pectinate, about one-fifth the length of the metatarsus; pubescence thin, short, longer on the legs, sides of metathorax and segments 5–6 of abdomen; pale, except on segments 5–6, where it is blackish. Length, 8 mm.

♂.—Resembles the female; mandibles, anterior tibiæ in front, and sometimes middle ones, and all the tarsi, reddish; a longitudinal yellow stripe on the clypeus and on each side of face. Length, 8 mm.

Carlinville, Illinois; 7 ♀, 5 ♂ specimens.

This species is oligotropic; the female gets her pollen exclusively from flowers of *Passiflora lutea*.

Perditella boltoniæ, sp. nov.—♀. Head and thorax greenish, shining, finely roughened, sparsely punctured; pubescence thin, pale; basal joint of labial palpi longer than the next three together; mandibles, except base, rufous; clypeus whitish; facial foveæ linear; legs dark, tarsi testaceous, claws simple; tegulæ pale testaceous; wings hyaline, nervures pale, subcostal nervure and borders of stigma and marginal cell darker; marginal and first cubital cells about equal, a little shorter than stigma; cubital cell 2 narrowed about ⅔ towards marginal, receiving recurrent nervure 1 just within, recurrent 2 interstitial with the second transverse cubital; third discoidal cell present; abdomen depressed, obovate, blackish, segments 2–3 each with a linear whitish band on each side of base. Length, 5 mm.

♂.—Resembles the female; third discoidal cell wanting; second cubital cell more strongly narrowed above; cheeks dentate; claws cleft; mandibles, except tips, labrum, clypeus, two small spots on each side above, scape in front, anterior tibiæ in front, and tarsi, whitish; abdomen without fasciæ, apical margins of segments narrowly pale testaceous, apex reddish. Length, 5 mm.

Carlinville, Illinois; 1 ♀, 5 ♂ specimens. Three male specimens have the scape dark, one has the labrum dark, one has no spots on face outside of clypeus. The second recurrent nervure in the male is evident in certain lights, but there is no thickening.

The female collects pollen of *Boltonia asteroides*. I regard it as an oligotropic visitor of that plant, but the female may get pollen from some other species of Compositæ.

Anthidium psoraleæ, n. sp.— ♀. Black, rather opaque, closely punctured; wings nearly hyaline, basal nervure ending before transverse medial, second recurrent nervure interstitial with second cubital; pulvilli wanting; mandibles with seven teeth; apex of clypeus with two teeth on each side; segment 6 of abdomen longitudinally carinate, apex bidentate, strongly sinuate laterally, with a lateral tooth; yellowish white ornaments as follows: longitudinal stripe on each side of vertex, spot on tegulæ in front, line above, spot on each side of base of scutel, and two lines on apical margin, lateral fasciæ greatly indented anteriorly on segments 2–5, broken in two on 1. Length, 11 mm.

♂. Segment 6 of abdomen with an incurved tooth on each side, 7 with three prominent teeth, lateral ones broad, with an incurved point, median one slender; ventral segments 4–5 emarginate, 6 with broad produced median portion, sides of its base sinuate; yellowish-white ornaments as follows: mandibles, clypeus, sides of face, longitudinal stripe on each side of vertex, dot on tubercles tegulæ in front, two lines on scutel, dot on anterior and middle knees, apex of tibiæ, metatarsi, two large lateral and two small discal spots on segment 1 of abdomen, anteriorly indented lateral fasciæ on segments 2–5, and two discal comma-shaped marks on 6. Length, 12 mm.

Carlinville, Illinois; 5 ♀, 14 ♂ specimens. One female has no line above tegulæ, three have no spots on sides of base of scutel. One male has no lines on scutel, four have no dots on anterior knees, five have none on middle knees, twelve have no discal spots on segment 1 of abdomen, one has the lateral fascia on segment 2 broken in two, four have no dots on tubercles.

Dianthidium boreale, n.sp.—♂. Closely resembles *D. notatum*, Latr., but the abdominal segments 6–7 have a median carina, which in the latter terminates in a tubercle; segment 6 has on each side an elevated portion, each terminating in a discal subapical tooth and a lateral apical one; pulvilli present; wings clouded, basal nervure almost interstitial with transverse medial, second recurrent nervure passing beyond second cubital; antennæ black; legs red, anterior and middle knees, apex of tibiæ and metatarsi, yellow; other yellow ornaments as follows: mandibles, face below antennæ, transverse line on vertex, tubercles, tegulæ in front, line above, four spots on scutel, large spot on each side of segment 1, arcuate fascia on each side of 2, two discal and two lateral spots on each side of 3–5, a large spot on each side of 6 covering the elevated portion, and all except base of 7. Length, 8 mm.

Carlinville, Illinois; 1 ♂ specimen.

Among several other good characters of *Dianthidium* may be mentioned the well-developed pulvilli.

Stelidium gn. nov., *trypetinum* sp. nov.—♀. Black; pubescence thin, pale; punctures coarse and close; mandibles narrow, tridentate, rufous before apex; maxillary palpi one-jointed; cubital cell 2 longer than 1, receiving both recurrent nervures about equally distant from base and apex; scutel simple; abdomen strongly conical; segment 6 longer than 5, apical margin carinate; ventral segment 6 longer than 5, nearly as long as wide, produced beyond dorsal segment, with a subapical carina; nearly obsolete whitish ornaments as follows: narrow anterior orbits, transverse spot on each side of vertex, four widely-separated equidistant spots near apical margins of segments 1–3. Length, 5 mm.

Carlinville, Illinois; 2 ♀ specimens. The venation, structure of abdomen, and the ornaments mark this as quite a peculiar form. I am quite sure it is an inquiline of *Trypetes carinatus*.

Melissodes vernoniæ, sp. nov.—♀. Black, clothed with pale whitish or griseous pubescence; some black hairs on the vertex in front, a subquadrate patch on the mesonotum and the scutel also with black hairs; hind metatarsi blackish beneath; segment 2 of abdomen has a narrow basal and a broader median whitish fascia; segments 3 and 4 with broad fasciæ reaching the apex of 4, and nearly reaching the apex of 3; segments 5 and 6 with pubescence black or fuscous; wings hyaline, nervures testaceous; middle of mandibles rufous: flagellum testaceous beneath. Length, 12–14 mm.

♂.—Resembles the female; pubescence nearly white throughout, thin on mesonotum posteriorly and on scutel where it is sometimes a little blackish; clypeus, spot on base of mandibles and on labrum white; antennæ yellowish, darker above, joint 3 about twice as long as 2; wings hyaline, nervure pale, much paler than in female; segments of abdomen with broad, pale, testaceous apical margins, 2–6 with submedian narrow, arcuate, whitish pubescent fasciæ, segments 5–7 with lateral spines. Length, 13 mm.

Carlinville, Illinois; 21 ♀, 15 ♂ specimens.

The female gets her pollen exclusively from *Vernonia fasciculata*. The male is quite white and resembles a large specimen of *M. nivea*.

In my neighbourhood there are three species of bees which have been referred to *Xenoglossa*. *Melissodes strenua*, Cr., is evidently a true *Xenoglossa*. It is proposed here to make *Macrocera pruinosa*, Say, the type of a new genus, *Peponapis*, and *X. ipomœæ* the type of a new genus, *Cemolobus*. In its group *Xenoglossa* is remarkable for having the antennæ of the male of the same form as in the female. In *X. strenua* the secondary sexual characters are reduced to a minimum, the mandibles, antennæ and claws of the male being about the same as in the female, and the clypeus of the female usually marked with yellow. The three species may be separated as follows:

Females.

Claws with a short inner tooth, that of the hind claw about one-fourth as long as the outer division; clypeus trilobed; mandibles with a distinct exterior angle; joint 2 of maxillary palpi nearly as long as 3–5, 4 nearly as long as 4 + 5; scopa nearly black; abdomen nearly black, with appressed glittering hairs; first cubital cell shorter than the third, hardly longer than the second ..... *C. ipomœæ.*

Claws cleft, inner tooth of hind claw more than one-half as long as the outer division; clypeus entire; scopa ochraceous ..... 1.

1. Mandibles with an internal tooth at base; maxillary palpi with joints 2–5 regularly diminishing in length; abdomen with more or less interrupted fasciæ of appressed ochraceous pubescence; cubital cell 1 a little shorter than 3, much longer than 2 ..... *X. strenua.*

Mandibles at apex bidentate; joints 2 and 3 of maxillary palpi subequal, 3 = 4 + 5; segments 2–4 of abdomen with whitish pubescent fasciæ; cubital cell 1 about as long as 3, twice as long as 2 ..... *P. pruinosa.*

Males.

Hind claws long, with a very short inner tooth; hind metatarsus arcuate, bevelled at the expense of its posterior inferior border, produced anteriorly; mandibles at apex bidentate, exterior angle spined; clypeus trilobed, with transverse apical whitish band; joint 3 of antennæ about as long as 4, 5–12 slightly diminishing in length; segments 6 and 7 of abdomen with dentiform lateral apical angles..... *C. impomœæ.*

Hind claws cleft; hind metatarsus simple; clypeus entire..... 1.

1. Joint 3 of antennæ = 4 + 5; base of mandibles yellow, with an internal tooth; clypeus largely yellow; segments 5 and 6 of abdomen with lateral basal spines, stronger on 6..... *X. strenua.*

Joint 3 of antennæ about one-third as long as 4, 5–12 slightly diminishing in length; mandibles tridentate, base black; clypeus with yellowish spot; apex of abdomen without spines.. *P. pruinosa.*

DESCRIPTIONS OF NORTH AMERICAN BEES.

BY H. L. VIERECK, PHILADELPHIA, PA.

Coelioxys Foxii, n. sp.

Coelioxys vigilans, Fox, not Sm. Tr. Am. Ent. Soc., XVIII., 344, 1891, ♀ ♂.

Conspicuous by its deeply-punctured thoracic dorsum and the orange to yellowish pubescence.

♀. Length, 10.5 mm. Clypeus rugose, with close, large, poorly-defined punctures, covered with a fine whitish pubescence, and having a whitish moustache; sides of the face covered with a yellowish appressed pubescence; near the ocelli this becomes erect; around the latter the hairs are dark brown, and form an erect fringe; a raised space in front of anterior ocellus, tapering down in front to a point terminating between insertion of antennæ, has a longitudinal impressed line along the middle on its lower half, and branches up to on each side of the anterior ocellus impunctate, dullish, the space between and surrounding punctured; an impunctate space between lateral ocelli and eye margins; top of the head punctured, dullish, the punctures smaller than those on dorsulum, almost bare; cheeks with appressed pubescence paler than that on sides of face. Dorsum of thorax with large deep punctures, shining, the punctures on dorsulum usually well separated, those on scutellum sparse, a narrow longitudinal area on the middle of scutellum impunctate; a semi-circular collection of appressed pubescence on scutellum, a spot of

the same adjoining the tegulæ and a line on anterior margin of dorsulum orange colour. The rest of the dorsum with inconspicuous black hairs. Posterior border of scutellum with a sharp edge, only slightly produced medially, the lateral teeth short and blunt. The pleura covered with pubescence similar to that on cheeks, only so thick as to obscure the tegument on the anterior and posterior borders of the mesopleura, which are deeply punctured and dullish; the legs covered with a white pubescence, that on the tibiæ and tarsi within golden. Wings darkened brownish, especially near the margins, nervures and stigma dark brown. First adominal segment with a groove on the anterior edge formed by the sharp edge and the almost ridge curve in back of the edge, with distinct, small, separated punctures; all of abdomen polished, the apical segment less than one and a half times as long as broad at base, tapering to a blunt point at apex, slightly pinched on the sides at the middle, a median longitudinal raised line on posterior half, an impunctate line on anterior half; the punctuation on the narrow part of apical segment indistinct, that on the broader half distinct, fine, the punctures separated; the rest of the segments with punctures only on the anterior and posterior margins; all the segments, except the apical one, with a narrow apical band of yellowish appressed pubescence, a line of appressed pubescence on each side of apical dorsal segment; the ventral segments with apical bands.

Black, mandibles, tegulæ, legs, basal segment and ventral segment dark ferruginous.

♂. Length, 8.5 mm. Essentially the same as the ♀ in sculpture and coloration, with the usual exception in structural characters incident to this sex; the face uniformly covered with thick appressed pubescence; the lateral scutellar spines more produced; apical dorsal segment less than one and a half times as long as broad, at apex drawn out into four sharp spines, the emargination not so deep, more semicircular, the width from spine to spine a little more than half the width of the apical segment at base; the upper spines a little shorter than the lower ones, one spine on each side long and narrow, the broad median furrow extending to within a short distance of the base of the apical segment.

Types: Coll. Am. Ent. Society. Type locality, Port Antonio (♀), Jamaica (W. J. Fox).

The ♂ is from Kingston, Jamaica. Both specimens are part of a collection made in Jamaica during April, 1891, by Mr. C. W. Johnson and Mr. W. J. Fox.

In sculpture and structure this species comes nearest to *C. abdominalis*, Guer., but that has the abdomen all red, is larger and different in various details.

Coelioxys Slossoni, n. sp.

Head and thorax black, dullish; abdomen shining, first three segments ferruginous, the rest black; wings fulvous, darker apically; antennæ dark brown to black.

♀. Length, 12 mm. Face covered with appressed whitish pubescence, which hides the surface of the tegument; head above an imaginary line across posterior ocelli deeply punctured, the punctures separated irregularly, none very far apart. There is an impunctate line extending down to the margin of the eye from each lateral ocellus; a compact, spade-shaped, raised area in front of anterior ocellus has its borders impunctate, dull, the space within punctured. Cheeks punctured, with white appressed pubescence not so dense as on the face; dorsulum with deep, good-sized punctures not all the same distance apart, some very close, not at all widely separated, an impressed line over the anterior half of dorsulum in the middle, a narrow band of yellow pubescence extends to each side of the impressed line, curved and meeting the tegulæ at the sides; scutellum punctured, much like dorsulum, duller, the spines short and rounded. Mesopleura flattened in front, giving the side a strong edge, the sides of mesopleura punctured, much like the dorsulum, pubescence very sparse, excepting on the margins, where it is abundant, and on the sides of the metathorax. Wings with space between first transverse cubitus and first recurrent nervure on the cubitus a little greater than that between the second transverse cubitus and the second recurrent nervure on the cubitus; transverse median nervure interstitial; nervures and stigma dark brown, almost black; tegulæ testaceous. Abdomen about twice as long as broad at base, first segment with well-defined large and small punctures, the larger ones a little smaller than those on dorsulum, second segment with much the same-sized punctures as those on the first, an impunctate narrow band across the middle. On the remaining segments the pattern is the same, excepting the apical segment, the puncture on each segment a little smaller than on the preceding, the impunctate band wider; apical segment with a medial longitudinal impunctate raised line; apical segment less than twice as long as broad at base, its outline that of a cone slightly pinched in the middle, the apex rounded; dorsal

segments, except the apical one, with a narrow white fascia, narrowest in the middle, the fascia on first segment narrow from side to side.

Black; legs from ferruginous to testaceous, chiefly a dark shade of the latter; anterior and median coxæ black. The legs have a whitish pubescence, except on the inner side of tibiæ and all of tarsi, where the pubescence is golden.

♂. Length, 11.5 mm. Exactly like the ♀, except for the usual sexual characters; pubescence on face abundant and not appressed; dorsal apical segment with six spines, one on each side at base testaceous, the four at apex black, simple, the lower pair longer than the upper, sharp, the upper pair short, blunt; scutellar spines longer than in ♀, broader at apex than at base.

Types: Coll. Am. Ent. Society. The ♀ deposited by Mr. Fox.

Type locality, Lake Worth, Florida (Mrs. A. T. Slosson).

The male is labeled "Fla." Two ♀♀ from Lake Worth; the co-type is identical with the type.

Megachile manumuskin, n. sp.

Thorax shining, punctured; scopa white, on apical segment black; inner side of tarsi in both sexes brilliant brownish.

♀. Length, 14 mm. Margin of clypeus almost even, the clypeus and a small space above closely punctured, the surface shining and almost bare, the rest of the face up to the ocelli indistinctly punctured, covered with an erect whitish pubescence, which extends down and covers the lower corners of the clypeus; top of the head not so closely punctured as the clypeus, shining, sparsely covered with black hairs; checks indistinctly punctured, covered with erect pubescence whiter than that on the face; space between posterior ocelli seemingly a little greater than that between them and eye margins; mandibles the shape of an obtuse angled triangle, with four teeth, the upper surface separated from the lateral surface by a raised opaque line, the upper surface with drawn-out punctures; antennæ with the first joint of the flagellum a little longer than the second. Dorsum of thorax shining, punctures on dorsulum close together; on the sides, in front, in the middle and behind the punctures are well defined and separated; punctures on scutellum distinct, closer than those on the middle of the thorax; the thorax above almost bare in the middle, near the margins with sparse black hairs, surrounded by white hairs on the margins; surface of the rest of the thorax indistinctly sculptured; metathorax almost smooth, opaque, almost

hidden by the abundant white pubescence. The legs, except the tarsi in back, largely covered with short, almost appressed whitish pubescence. Wings brownish hyaline, nervures very dark brown; tegulæ shining, punctured. Abdomen shining, the dorsal segments with a polished, then a punctured band, an apical subopaque band finely punctured; first segment with erect whitish pubescence, the second dorsal segment with short whitish pubescence at the base, a narrow whitish band of appressed pubescence on the apical border of the punctured band; segments two, three and four with similar fasciæ, otherwise the segments have short, black, erect hairs in abundance: the apical segment is finely, closely punctured, slightly impressed on each side, black haired. Almost entirely black, claws dark brown in part.

♂. Length, 11.5 mm. Very similar to the female; hair on face yellowish, the clypeus with a long moustache, hairs on top of head pale and fine; first joint of flagellum plainly shorter than the second; anterior coxæ armed with a prominent spine; apical dorsal segment with a broad, uneven, elliptical emargination, the sides of the segment with large teeth, the right side having but one, the left side two; the pointed process of apical ventral segment long; when looked at from back, its tip is on a level with the tips of the sides of the apical dorsal segment.

Types: Coll. Acad. Nat. Sciences, Philadelphia.

Type locality, Manumuskin, New Jersey, June 24, 1901 (E. Daecke). Co-type ♀, same date, same place. One ♂, Clementon, N. J., June 5, 1901; DaCosta, N. J., July 14, 1901. The thoracic pubescence in these specimens has an ochreous tint. Two ♂ ♂, Iona, N. J., June 16, 1902. In one of these specimens the lateral processes and the apical process of apex of abdomen are abbreviated, but hold the same proportion to each other as the typical specimens. The species compares well with *M. frugalis*, Cress., but that differs in the distinct punctuation of head and thorax with shining surface; the emargination is regular, semicircular, the tooth beneath short. The type was compared with the type of *M. frugalis*, Cress., ♂, in the U. S. National Museum.

Frederick Smith described three species of the genus *Colletes* from North America. Up to the present time only one species, *C. thoracicus*, appears to have been identified. I submit descriptions of what are taken to be *C. mandibularis* and *C. nitidus*, the remaining species.

Colletes mandibularis, Sm.

Colletes mandibularis, Sm. Brit. Mus. Cat., I., 5, 1853. ♂. Type locality, Georgia.

♀. Length, 8 mm. Clypeus almost bare, shining, with punctures lengthened and often confluent, near the margins the punctures are more regular, the rest of the face covered with a dirty-looking pubescence, not long nor so thick as to obscure the surface, which is so closely punctured as to have a rugose appearance; the head above shining, indistinctly punctured, the pubescence longer and sparser than on face, rather yellowish; labrum with a distinct dent in the middle, to the sides polished and with traces of dents; mandibles grooved, with an almost obsolete tooth within the apex; the cheeks with a paler pubescence, the sculpture indistinct; first joint of flagellum distinctly longer than the second; hardly any space between eyes and base of mandibles; dorsulum shining, with close, distinct, deep punctures, punctures sparse in the middle of posterior half; scutellum with a few punctures. Mesopleura with distinct punctures, closer than on the dorsulum; disc of metathorax divided into pits, the middle one almost oblong, the largest, the lateral each narrower than the one before; enclosure of posterior face of metathorax with a broad neck, its surface not perfectly smooth, but shining, the neighbouring areas indistinctly sculptured, less shining than the middle area; the thorax above with a short yellowish pubescence, that on the sides whitish, the same on the legs. Abdomen subopaque, very finely sculptured with indistinct punctures, those on first segment not so close as on the rest, therefore it is more shining; the base of abdomen pubescent, much like the dorsum of thorax, the other segments with a thin, light, appressed pubescence, except the apical segment; all with a distinct fascia of appressed yellowish pubescence; ultimate segment with brown hair. Black mandibles and tibiæ brownish; wings yellowish, nervures brown; stigma paler; first recurrent nervure received by the second submarginal cell a little before the middle.

♂. Length, 7 mm. Excepting the ordinary sexual characters, the male fits the description of the ♀. Face below antennæ hidden with a long, yellowish pubescence; pits on disc of metathorax narrower; tarsi testaceous.

Four specimens from Georgia (Morrison), Coll. Am. Ent. Soc.

Colletes nitidus, Sm.

Colletes nitidus, Sm. New Sp. Hym., B. M., p. 1, 1879, ♀ ♂. Type locality, E. Florida.

♂. Length, 8 mm. Face below antennæ hidden by long, pale pubescence, faintly yellowish; face above indistinctly sculptured,

pubescence thinner and darker than that below; top of the head shining, also indistinctly sculptured; cheeks roughened, with white pubescence; labrum with a median dimple; first joint of flagellum equal to the length of the second; space between eyes and base of mandibles very narrow; dorsulum shining, with small, well-separated punctures; scutellum similar. Mesopleura closely punctured, shining; disc of metathorax divided in the middle by a sharp longitudinal ridge, the space on each side divided into pits by less conspicuous ridges; enclosure funnel-shaped, the neck narrow, about twice as long as wide at base, the surface polished, the neighbouring areas shining, indistinctly sculptured in spots; thorax above covered with a slightly yellowish pubescence; the sides, the metathorax in back and the legs covered with white pubescence; wings yellowish hyaline, nervures light brown, the stigma almost testaceous; first recurrent nervure received a little beyond the middle of second submarginal cell. First abdominal segment highly polished, with very fine, widely-separated punctures, the pubescence very thin and long, whitish, the rest of the segments closely, indistinctly punctured, the pubescence whitish, short and lying on the surface, the fasciæ formed by the hairs not at all prominent; apical segment with whitish appressed pubescence.

Black; tarsi and claws almost testaceous; flagellum very deep brown.

One ♂ specimen from College Park, Maryland, September, 1892. (Received through Mr. Quaintance.)

BOOK NOTICE.

CATERPILLARS AND THEIR MOTHS.—By Ida Mitchell Eliot and Caroline Gray Soule: The Century Co., New York; 302 pages 8vo., 80 plates. (Price, $2.00 net).

This is a very interesting and satisfactory book, written in an entertaining manner and full of useful information for any one who is engaged in rearing moths and studying their life-histories. The great value of the work consists in its evident originality; the writers give us their own experiences and record their failures as well as successes. The first portion of the volume describes the simple apparatus employed in rearing caterpillars, how to take care of them, where to look for them, and tells as much as the ordinary collector requires to know about the eggs,

caterpillars, cocoons, pupæ, and finally the moths. The perusal of these chapters will greatly help any one trying to rear Lepidoptera and enable him to avoid many mistakes that he would otherwise be sure to make. A sufficient description is given of the external structure of these insects in their various stages to enable the reader to make intelligent records of his observations which will have some scientific value. A chapter is also devoted to the Parasites which so often disappoint one who has been patiently rearing a caterpillar and hoping to secure a perfect specimen of some rare moth. The following passage gives some admirable advice: "The best part of any one's equipment is the power of observation—quick seeing, unfailing carefulness, exactness of noticing and stating, and the patience which works hard and well, can bear the failure of its best plans and experiments, and begin over again next season with as much zest as before. Faithfulness, accuracy and patience are absolutely necessary to satisfactory work of this kind."

The second and larger portion of the volume records the life-histories, more or less complete, of about fifty species of moths belonging to the Sphinges, Bombyces and Noctuids, and tells how they were reared and brought safely to the perfect state. These descriptions are remarkably good and, what is more, highly interesting, being written in simple language free from all technicalities that are not necessary for accurate statements. The illustrations are regarded by the publishers as a unique feature of the book. They are 80 in number, beautifully executed photogravures, many of them perfect representations of the insect, for instance the moth and caterpillar of *Sphinx Kalmiæ* (p. 136), but a large number, we are sorry to say, are most disappointing, the specimens photographed being badly set, often imperfect and in some cases almost unrecognizable. As examples we may mention the moths of *Amphion nessus*, *Ampelophaga myron*, and *Leucarctia acræa*. The caterpillars are nearly always beautifully depicted, and it seems a great pity that perfect and properly set specimens of the moths were not chosen for representation. These defects impair the beauty but do not affect the value of the book, which will be a source of pleasure and a storehouse of information to every nature-lover who takes an interest in watching and studying the actual living objects and is not content with mere dead and dried specimens.

Mailed December 4th, 1902.

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ERRATA.

Page 86, line 10, for Arochnophila read Arachnophila.
Page 220, line 27, for Jujurtha read Jujurtia.
Page 227, line 10, for Elampenæ read Elampinæ.
Page 268, line 23, for Ameriginæ read Amesiginæ.
Page 271, line 2, for Dissemphalus read Dissomphalus.
Page 272, line 7, for Epyrus read Epyris.
Page 273, line 23, for Perisimus read Perisemus.

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